Question

Bluetongue will affect primarily which species with clinical signs of illness?

- Pigs
- Horses
- Goats
- Sheep
- Cows

Explanation - The correct answer is sheep. Cattle may suffer reproductive losses, but they rarely show clinical signs of the systemic disease. Culicoides gnats vector bluetongue virus. Bluetongue is in the Reoviridae family. In sheep, the virus causes vasculitis and leakage of serum resulting in initial signs that include fever, edema of the face, muzzle, lips, and ears, and respiratory difficulty. Ptyalism and hyperemia will also be present. You can expect to see large amounts of mucopurulent nasal discharge. The tongue might be cyanotic (hence the name of the disease). Oral ulceration will be present and thus need to be differentiated from other ulcer producing diseases such as foot-and-mouth disease. Pulmonary edema and lameness are also often present. Bluetongue also causes teratogenic and reproductive effects both in sheep and cattle. If you see a picture of a stillborn or weak calf with "white eye calf syndrome" it is possibly a result of being infected with bluetongue. These calves have white eyes because they are born with congenital cataracts.

Cyanotic tongue.

Inflamation of the muzzle and salivation.

Ulcers and necrosis of the muzzle.

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Question

You have encountered white muscle disease in a large commercial flock of sheep, and wish to examine the selenium status of the flock. You decide to collect samples. What samples should be collected in order to accurately assess the selenium status of the flock?

- Urine for 20 random sheep to determine glutathione peroxidase activity
- Whole blood from 20 random sheep to determine selenium levels
- Blood from 20 random sheep for creatine kinase levels
- 20 random pasture samples for Selenium analysis
- Serum from 20 random sheep to determine vitamin E levels

Explanation - Whole blood selenium is preferred over plasma or serum levels.

If animals fall below 0.05 ppm Se, most of the animals will benefit from Se supplementation. Those with marginal Se (0.05 to 0.06 ppm) may sometimes also benefit, while those over 0.07 ppm are considered normal.

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Question

A goat herd is suffering from mastitis in does and concurrent polyarthritis and pneumonia in goat kids. The kids range from several days old to weaning age and have one or more swollen joints which are hot to the touch. Affected kids are running high fevers and are unwilling to move. Mastitic does have firm udders and brownish watery milk with occasional garget. The does are also depressed and febrile. The owner has tried treating with several different antibiotics and has had no success. What is your top differential?

- White muscle disease
- Arcanobacterium pyogenes
- E. coli
- Mycoplasma mycoides ssp. mycoides

Explanation - The correct answer is Mycoplasma mycoides ssp. mycoides. Many times, this is a typical presentation in goats. All the other choices are not going to result in concurrent mastitis in does and polyarthritis and pneumonia in kids. This is usually a milk-borne disease that is introduced by asymptomatic carriers. The fact that the owner treated without success is a huge clue because Mycoplasma is not responsive to antibiotic therapy.

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Question

A 1-year old commercial ewe in a large flock presents to you with a discrete mass on the ventral neck. You aspirate the mass and culture the thick pus which contains Corynebacterium pseudotuberculosis. The owner reports that the flock has never before had any C pseudotuberculosis lesions. What is the best action to recommend?

- Surgical excision
- Penicillin
- Drainage
- Cull
- Surgical excision and penicillin

Explanation - The correct answer is cull. This disease is caseous lymphadenitis, which tends to recur with excision and is usually not controlled with antibiotics due to an inability to penetrate into abscesses. Because of the propensity of this disease to recur in addition to the concern of spreading the disease if carriers are not culled, treatment is not typically recommended. If this were a valuable individual, then surgical drainage or abscess removal, antibiotics and isolation until healing had occurred would be possible approaches. Vaccine is also available for flock protection.

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Question

Absence of dorsal lung sounds with audible ventral lungs sounds in a goat with dyspnea, tachypnea and normal temperature would indicate which of the following conditions?

- Pneumothorax and collapsed lung
- Pulmonary edema
- Ovine progressive pneumonia
- Ovine progressive pneumonia
- Pleural effusion

Explanation - The collapsed lung can still be heard ventrally, but the dorsal thorax is quiet and air-filled. With pneumothorax, air can enter the thorax through a damaged lung or through a chest wall injury.

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Question

Many sheep in a flock are experiencing chronic weight loss and are doing poorly. They do not have diarrhea. On your examination, you note that they appear pale. You do a fecal exam and find trichostrongyle eggs. What is the most likely cause of their clinical signs?

- Nematodirus infection
- Dictyocaulus infection
- Haemonchus infection
- Ostertagia infection

Explanation - The correct answer is Haemonchus infection. All of these are trichostrongyles that infect ruminants but Haemonchus is the only one that should cause anemia and frequently does not cause diarrhea. Haemonchus is also much more common in sheep and goats, while the other answer choices tend to be seen more often in cattle.

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Question

A 3-year old female goat is displaying signs of decreased activity with right sided ptosis and drooling. On examination, you notice a decreased palpebral reflex on the right side. The goat has a temperature of 104F. What is the most important and appropriate therapy for the goat's suspected condition?

- Administer 1 mg of Selenium and 500 units of Vitamin E once and then add supplementation to the feed
- Administer procaine penicillin, 40,000 units per kg every six hours
- Administer levamisole 8 mg/kg once

- Administer Thiamine 10 mg/kg every six hours

Explanation - The key to answering this question is the unilateral nature of the clinical signs which are most typical of Listeriosis in goats in contrast to other common neurologic conditions such as Polioencephalomalacia (thiamine or Vitamin B1 deficiency). This infection is most common in goats fed silage (although that information was not provided in this question).

Thiamine administration would not be inappropriate but is not the most critical therapy for Listeriosis.

The signs in this goat are not suggestive of white muscle disease which is caused by selenium deficiency. They are also not suggestive of lungworms or roundworms which might be treated with levamisole.

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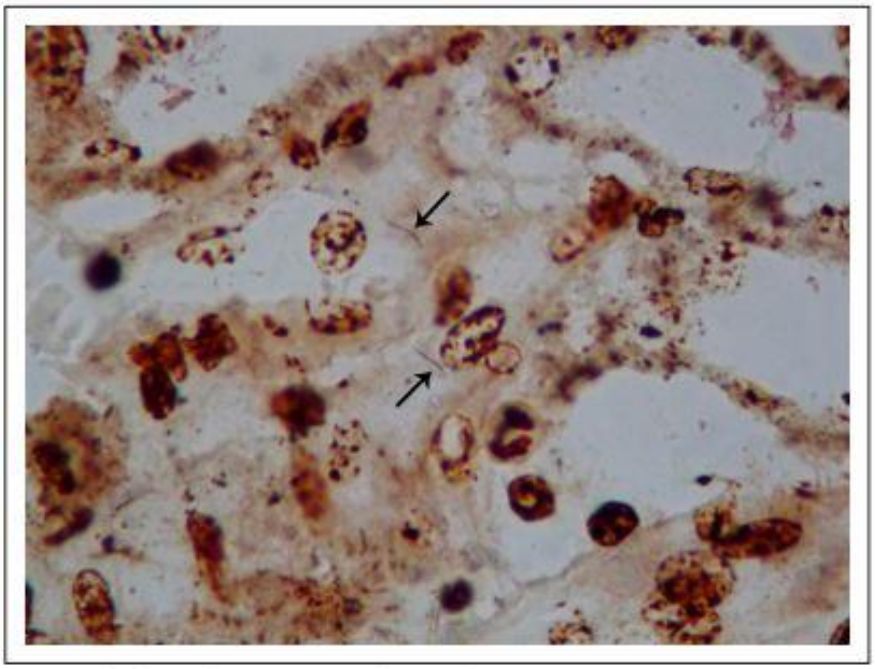
Question

A 4 month old lamb in a pasture in California during the rainy season has icteric mucous membranes and sclera (see image), and is anemic, febrile, and lethargic. Several lambs in the same pasture have died in the last few days. Postmortem exam reveals extensive icterus and many scattered petechial hemorrhages. You suspect leptospirosis. Which of the following tests is most likely to be both sensitive and specific in helping make a diagnosis of leptospirosis?

- Culture of renal tissue
- Serum antibody using microscopic agglutination test
- Immunoperoxidase staining of renal tissue for leptospirosis
- Darkfield microscopy
- Urine culture

Explanation - Immunoperoxidase staining of renal tissue for leptospirosis. Various tests are used, but this may be the most sensitive and specific. It is VERY difficult to culture lepto from tissues or urine. The animals died acutely, so serum antibody titers are unlikely to be raised. Darkfield microscopy has low sensitivity in clinical cases.



Source: Taken by optika B353 PL, Digital Pro 3, Italy
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FIGURE 4: Warthin-Starry staining of kidney. Presence of filiform, dark brown *Leptospira* (arrows) on the apical surface of epithelial cells in the cortex.

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Question

Which of the following is the most likely clinical sign in a sheep with a tetanus infection?

- Diarrhea
- Trismus
- Facial paralysis
- Poor muscle tone

Explanation - The correct answer is trismus (aka lockjaw). The usual clinical signs of tetanus begin with stiffness or lameness in a limb ascending to generalized stiffness, a raised tail head, saw-horse stance, trismus (sardonic grin), locked jaws due to muscle rigidity, and rigid paralysis. Pyrexia is common as well.

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Question

What species are primarily affected by both internal and external caseous lymphadenitis, a manifestation of Corynebacterium pseudotuberculosis?

- Cows and sheep
- Pigs and horses
- Horses and cows
- Goats and pigs
- Sheep and goats

Explanation - Sheep and goats. The cutaneous abscesses caused by this organism also affect cattle. Horses experience pectoral abscesses, internal abscesses, and other sites, as well ulcerative lymphangitis (also caused by C. pseudotuberculosis) of the limbs.

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Question

You are examining an acutely dyspneic goat. You pull a venous blood sample and note that the blood is strikingly bright red. What caused this?

- Cyanide toxicity
- Nitrate toxicity
- Pyrrolizidine alkaloid toxicity
- Brassica plant toxicity

Explanation - The correct answer is cyanide toxicity. Cyanide blocks cellular respiration and blocks oxidative transport. As a result, hemoglobin cannot release oxygen to the tissues, and venous blood stays saturated with oxygen and is bright red. Nitrate toxicity causes blood to appear brown. Brassica causes pulmonary toxicity, which would be more likely to lead to cyanosis than bright red blood.

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Question

A practice you recently interviewed with told you they will offer you a number of ancillary benefits if you work full time. This may include:

- Percentage of gross production or salary
- Holidays off
- Vacation allowance
- Professional membership dues
- Health insurance

Explanation - Professional membership dues. Anancillary benefit is an additional benefit not part of the expected core offer. Examples of these benefits include membership dues, continuing education allowance, DEA license dues, moving expenses, gym memberships, etc.

In this question, a vacation allowance, holidays off, salary, and health insurance are all expected benefits in a core offer for a full-time employee at a veterinary clinic.

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Question

A cystotomy is on the schedule for today on a 4 year old male Chihuahua. What suture would you not use for closing the bladder?

- Vicryl
- Dexon
- Silk
- Polydioxanone (PDS)

Explanation - The correct answer is silk. This suture is non absorbable and thus contraindicated. Leaving non-absorbable suture in the bladder is a potential nidus for infection.

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Question

A nine-month old La Mancha goat was noticed to be losing weight over the last week. The owner brought the goat in from pasture and fed the goat 2 pounds of grain mix twice daily along with free choice of hay and alfalfa. Last night, the goat was seen staggering and bumping into things. Vaccinations are current and no other goats appear to be affected. On physical exam, the goat was found to be blind, with an intact pupillary light reflex. The goat was also opisthotonic, hypertonic, hyperreflexic, and tetraplegic. Where is the lesion?

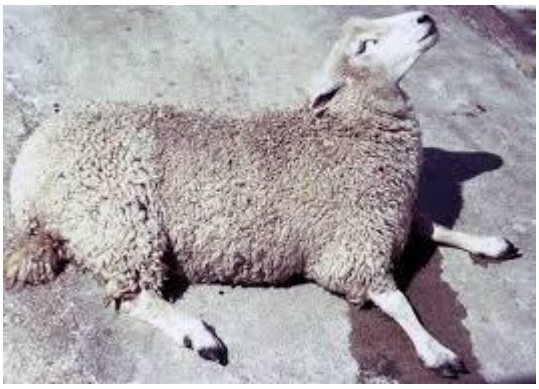
- Brain stem
- Cerebellum
- Cerebrum

- C1-C6

Explanation - The correct answer is cerebrum. The history and clinical signs described are compatible with grain overload, which will result in **polioencephalomalacia**. This disease will cause destruction of the gray matter in the cerebrum.

Polioencephalomalacia – Dt thiamine deficiency in ruminants. Usu < 2 y.o. Noninfectious neuro diz caused by thiaminase (vita B1). Thiaminase can be produced by gram+ overgrowth in rumen, bracken fern, moldy feed. Abrupt mgmt changes such as movement from poor to lush pastures, antibiotic changes, low Co in diet. Results in ↓ energy in brain, neuronal necrosis, astrocyte swelling, worse in cortex.

- Clinical Signs - Sudden onset. Brain signs in small ruminants. Star gazing, opisthotonos, disturbed gait (ataxia), cortical blindness, tremors, salivation, convulsion, coma, death.
- Diagnosis - Blood thiamine levels. At necropsy, black light.
- Treatment – Thiamine (vitamin B1) supplementation in repeated doses, should see dramatic results within 24-48 hrs. Also, antinflammatories, fluid therapy, nutrition, roughage.
- Prevent – Slow mgmt changes, ↑ % roughage in diet, feed thiamine HCl - Brewer's Yeast.



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Question

Breeding two individual sheep that are both carriers of hereditary chondrodysplasia, an autosomal recessive trait, will result in what percentage of the offspring being affected and demonstrating this trait?

- 25%
- 0%
- 50%

Explanation - 25% of the offspring will be affected, 50% will be carriers and 25% will be normal without carrying the trait. Ovine hereditary chondrodysplasia (Spider Lamb Syndrome) is an example.

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Question

What species is the principle carrier and vector of Malignant Catarrhal Fever (MCF) virus in North America?

- Horse
- Bison
- Cattle
- Sheep

Explanation - MCF virus is ovine herpes virus-2 (OvHV-2) and is carried by 95-99% of sheep in North America which show no symptoms. It is also carried by 75% of domestic goats, 40% of muskox, 37% of bighorn sheep, 25% of pronghorn antelope, 62% of mouflon sheep, and by a small percentage of elk, mule deer, and white tailed deer. Susceptible hosts include cattle, water buffalo, deer, pigs, and bison; bison are the most susceptible.

Malignant Catarrhal Fever – Gammaherpes virus. Acute, sporadic, infectious and highly fatal diz of cattle near lambing sheep. Little to no cow to cow transmission. Also see in farmed deer, wildebeests. Low morbidity, high mortality (lethal).

- Clinical signs - Extensive erosion and edema of GIT and URT. Keratoconjuctivitis, photophobia, corneal opacity, blindness, pytalism, encephalitis, and lymphadenopathy. Also interstitial infiltration of organs by lymphocytes. Kidney - evident as white, raised foci under capsule.
- Diagnosis – Virus isolation, ELISA, IFA. Cross reacts with other herpesviruses.
- Treatment and control – Survival rare, if so, carriers. Separate from source.

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Question

Your neighbor and friend recently acquired several llamas for his farm. He of course would like for you to provide veterinary care and advice. He would like to breed one of the females but knows nothing about breeding llamas. He has bred his mare before though and does have some knowledge of equine reproduction. Which of the following do you tell him?

- Llamas are induced ovulators and do not have regular estrous cycles.
- Llamas are seasonally polyestrous in captivity and cycle when day length is long.
- Llamas cycle every 21 days like goats during months March to July and are spontaneous ovulators.
- Llamas cycle every 6 months; monitor for behavioral signs of estrous and separate the breeding female into a pen with the male for 7 to 10 days.

Explanation - Llamas are unique and don't have a normal heat cycle. The female llama is an induced ovulator. An egg is released around 24 to 42 hours after mating and often fertilized on the first attempt. They may be bred any time of year.
Also, note that llamas are also unique in that they mate in a Kush (lying down) position, and mating lasts for 20-45 minutes.

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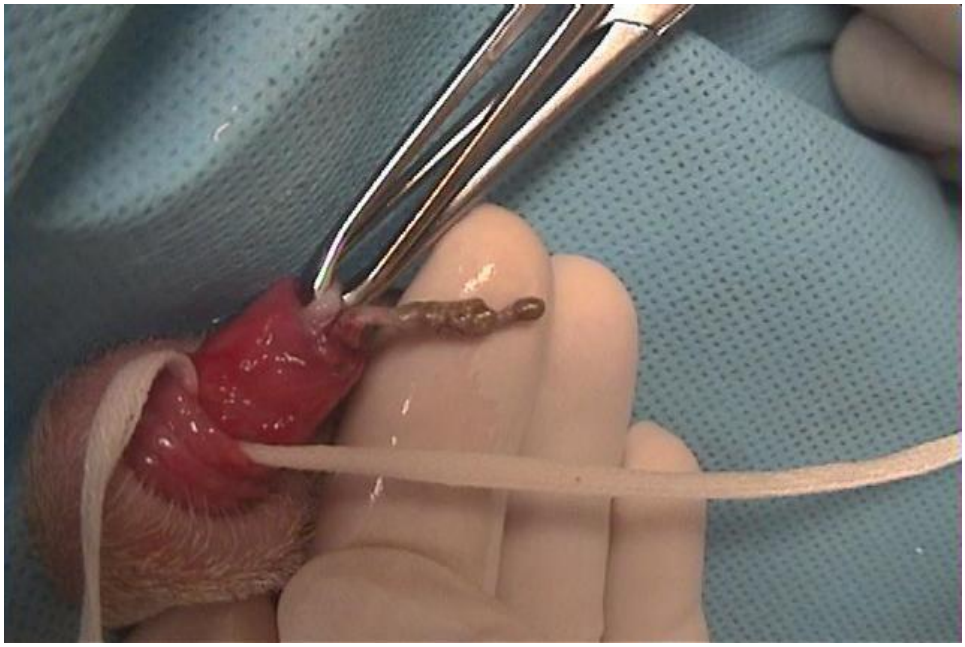
Question

A 6-month old wether sheep has been straining to urinate. You find the animal to be non-febrile but to have a rapid heart rate and respiratory rate. Ultrasound demonstrates a distended urinary bladder. Using sedation, you find several small stones lodged in the urethral process as shown in the picture. What is the best next step to take?



- Place a percutaneous Foley catheter in the urinary bladder
- Pass a retrograde urinary tract catheter and flush the stones back into the bladder
- Amputate the urethral process and observe for urination
- Perform surgery and pass a catheter from the bladder down the urethra and flush out all stones

Explanation - Amputate the urethral process and observe for urination. Some sheep will only have stones in the urethral process, as it tends to be the narrowest diameter in the urethra. But in many cases there are additional stones in the urethra and/or bladder, and the animal will re-block. At that point, more aggressive procedures are indicated.

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Question

A 3-year old Nubian male goat presents with a history of breaking into a bag of grain meant for horses. What disease process are you concerned about?

- Urolithiasis
- Abomasal impaction
- Rumen acidosis (grain overload)
- Thiamine deficiency

Explanation - The correct answer is rumen acidosis. Excessive consumption of grain or other readily fermentable carbohydrate will lead to replication of Streptococcus bovis and other gram positive bacteria in the rumen at first, lowering the rumen pH precipitously to below 4.5 and causing an increase in lactic acid. Lactobacilli will subsequently multiply due to the favorable conditions created by S. bovis. The lactobacilli crank out a whole bunch more lactic acid. The goat cannot metabolize the D-lactic acid made by bacteria (mammals can only process L -Lactic acid which they produce themselves), and a systemic lactic acidosis results. Clinical signs include rapid HR, depression, anorexia, fluid-filled rumen, scleral injection, diarrhea, and staggering.
Thiamine deficiency results in polioencephalomalacia.

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Question

Pregnancy toxemia may occur in ewes and does in the last 2-4 weeks of gestation secondary to insufficient energy intake. Which of the following compounds is the body deficient in?

- B-hydroxybutyric acid
- Acetone

- Acetoacetic acid
- Oxaloacetate

Explanation – The correct answer is oxaloacetate. During times of negative energy balance the body is unable to produce enough oxaloacetate to feed into the citric acid cycle. This results in mobilization of fat and subsequent production of ketones. The other answer choices are ketones.

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Question

Every time an owner shears his sheep, 10% develop large abscesses in their lymph nodes several weeks or even months after shearing. What should the owner do to control/prevent this problem the next time he shears his sheep?

- Pretreat all animals with gentamicin
- Cull any affected individuals before shearing
- Disinfect shears before shearing and between shearing sheep
- There is nothing the owner can do; the disease will run its course

Explanation - The correct answer is to disinfect shears before beginning and between shearing sheep. The sheep are most likely being infected with caseous lymphadenitis (also commonly called boils) which is caused by Corynebacterium pseudotuberculosis. This organism is highly contagious and commonly transmitted at shearing when nicks and cuts occur. When you lance these abscesses, make sure to keep the area very clean and decontaminate everything to avoid spreading the disease.
The rancher should also consider vaccination against caseous lymphadenitis.

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Question

What causes swayback in sheep and goats?

- Magnesium toxicity
- Magnesium deficiency
- Copper deficiency
- Iron deficiency

Explanation - The correct answer is copper deficiency. Copper deficiency can be primary (due to low copper intake) or secondary (due to high molybdenum, sulfur, iron, or other factors such as alkaline soil, high selenium, zinc, vitamin C, etc).

Copper deficiency can cause a number of signs including microcytic anemia, decreased production, achromatorichia, heart failure, infertility, swollen joints, gastric ulcers, and diarrhea. The two diseases that are specific to copper deficiency are **enzootic ataxia** and **swayback**, which are seen in young lambs and kids and are caused by lack of myelination. Clinical signs of progressive ascending paralysis, incoordination, muscle atrophy and weakness are most common.

Copper Deficiency - Common in **Texas** in young pastured ruminants. Cu stored in liver, absorbed in SI and excreted in bile. 1º dt decreased Cu in soil and forage, 2º dt interdependent - ↑Mo ↓Cu, ↑Fe ↓Cu, S→Mo.

- Clinical signs – Unthiftiness, achromotrichia, diarrhea, lameness, demyelinization, falling disease. Swayback in lambs, anemia.
- Diagnosis – Liver Cu [ ], serum Cu [ ], cerulopasmin in serum, diet Cu [ ].
- Treatment – Copper gylcinate injection every 6 mos SQ. Copper sulfate in feed. Copper oxide needle bolus.
- Prevent – Salt/trace mineral mixes with Cu. $CuSO_4$ fertilizer.

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Question

What is the usual treatment for a doe infected with Corynebacterium pseudotuberculosis in the mammary gland?

- Cull or isolate

- Antibiotics
- Frequent milking every 2 hours
- Vaccinate affected animals against caseous lymphadenitis

Explanation - The correct answer is to cull or isolate, since this organism is able to survive in abscesses that can be walled off and inside macrophages, making it very difficult to treat. Staphylococcus aureus is also very difficult to treat, and many times the animals are culled when infected with this organism. A life-saving mastectomy may be performed in valuable animals.

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Question

What is the most common cause of hemolytic anemia in sheep?

- Leptospirosis
- Babesiosis
- Molybdenum toxicity
- Copper toxicity

Explanation - The correct answer is copper toxicity. Sheep are the most sensitive food animal when it comes to copper. Copper toxicity in sheep can occur when they are fed **cattle or horse feed**, get into copper foot baths, or from copper contamination of the environment from spraying or dipping fence posts in copper-containing compounds as a preservative. On the other hand, swine are fairly resistant to high levels of copper.

Copper Poisoning – Sheep. Chronic ingestion of excess amount of Cu leads to sequestration in liver. A stressor induces sudden release of copper from the liver, resulting in severe intravascular hemolysis.

- Clinical findings - Acute hemolytic crisis, depression, weakness, anorexia, hemoglobinuria, jaundice.
- Control - Restrict copper intake; supplement with molybdenum.

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Question

You encounter some infertile rams in a commercial flock of sheep. You wish to determine why they might have palpable hard lumps on the epididymis and whether this could be the cause of infertility before culling is considered. Which of the following would be the best way (sensitive, specific, and cost-effective) to determine this?

- ELISA for Corynebacterium pseudotuberculosis
- History of Corynebacterium pseudotuberculosis lesions in the flock
- Perform biopsy of testicular tissue
- ELISA for Brucella ovis
- Culture semen samples from these rams

Explanation - If these rams have not been given the B. ovis vaccine, then a positive B. ovis ELISA means that B. ovis is likely the cause of the epididymitis and infertility.

Brucellosis in sheep - *Brucella melitensis*, abortion. *B. ovis*, produces disease unique to sheep. Epididymitis and orchitis impair fertility.

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Question

Five goats in a ranch have developed large submandibular and prescapular abscesses. What is your first course of action?

- Call state officials
- Begin antibiotics
- Isolate affected animals

- Lance abscesses

Explanation - The correct answer is isolate affected animals. These goats are likely to be infected with caseous lymphadenitis (caused by Corynebacterium pseudotuberculosis) which can potentially be a herd problem since it is contagious.

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Question

Several animals of a herd of silage fed goats are showing signs of circling, dysphagia, and unilateral dropped lip. On your examination, you also note a lack of a menace and palpebral reflex unilaterally in several of these animals. What is the most likely diagnosis?

- Brain abscess
- Polioencephalomalacia
- Rabies
- Listeriosis

Explanation - The correct answer is listeriosis. The key to answering this question is the unilateral nature of the clinical signs. Because Listeria infection is caused by an ascending infection, usually of the trigeminal nerve, the signs are frequently unilateral. The other big hint was that the animals were fed silage. Listeria is a common inhabitant of spoiled silage because it thrives in a microaerophilic, low pH environment.

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Question

A farmer calls you to examine his sheep flock because several newborn lambs have been born with domed heads, short limbs, and thick trunks. They also exhibit tremors and have fine hairy wool. What is the most likely cause of these signs?

- Mineral deficiency
- Genetic disorder
- Bacterial infection
- Infection with Border Disease virus

Explanation - These signs are consistent with infection with Border Disease virus, a pestivirus transmitted from the ewe to the fetus when infected **before 80 days gestation**. Ewes infected during gestation can have lambs that are aborted, macerated, or mummified but surviving ones may exhibit the "hairy shaker" syndrome described due to infection of hair follicles and the cerebellum. Border disease virus is a close relative of BVD virus.

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Question

A 7-year old doe presents with abscessation of the supramammary lymph nodes. What is the most likely diagnosis?

- Caprine arthritis and encephalitis virus

- Corynebacterium pseudotuberculosis
- Mycoplasma mycoides
- E. coli
- Arcanobacterium pyogenes

Explanation - The correct answer is Corynebacterium pseudotuberculosis. This is a description of caseous lymphadenitis. Infection of supramammary lymph nodes in sheep and goats is of economic importance due the fact that caseous lymphadenitis can cause weight loss in the individual, can become a herd problem, and could also be a potential public health concern.

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Question

A sheep farmer that you work with has had 5 four-to-five month old lambs die recently. They have glucosuria and decompose rapidly. You suspect Clostridium perfringens type D. Which of these steps would you recommend to try to prevent loss of more lambs?

- Treat all lambs with a course of IM penicillin
- Increase grain in diet
- Vaccinate the dams
- Vaccinate the lambs

Explanation - The correct answer is to vaccinate the lambs twice with toxoid/bacterin at 4 week intervals. Because it will take time for this active immunity to work, you can also give Cl perfringens type D antitoxin at the time you administer the first vaccination. Clostridial enterotoxemia in lambs is most frequently caused by Clostridium perfringens type D and affects **lambs on rich feed**. Vaccinating the dam provides passive immunity for about 2 to 3 months. Decreasing the quality of pasture from rich clover, or decreasing the amount of grain and concentrate can also be effective but is sometimes not practical from a production standpoint.

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Question

There are many adult sheep in a flock that are experiencing chronic weight loss. Some have diarrhea and submandibular edema. You perform a necropsy on an affected sheep and find thickened, corrugated intestines around the ileum. You find numerous acid-fast rods when you stain an ileocecal lymph node. What is the most likely diagnosis?

- Clostridium perfringens type D
- Cryptosporidium parvum
- Johne's disease (Mycobacterium avium ssp. paratuberculosis)
- Caseous lymphadenitis (Corynebacterium pseudotuberculosis)

Explanation - The correct answer is Johne's disease (Mycobacterium avium ssp. paratuberculosis). You should have been able to make this your answer without the help of the finding of acid-fast rods but that makes the answer a 'slam dunk'. Johne's is typically a disease of chronic wasting, affecting animals 2 years and older. Cryptosporidium and Clostridium perfringens are causes of diarrhea but tend to be more acute and in lambs. Cryptosporidium does also stain acid-fast but is not a rod and would not be found in a lymph node; it is usually seen in fecal smears.

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Question

A rancher plans to raise 1000 lambs for slaughter. They are currently 2 months old and he is moving them to lush pasture to begin fattening. Of the following, which disease should the veterinarian advise him to vaccinate against immediately?

- Enterotoxemia caused by Clostridium perfringens type D
- Caseous lymphadenitis caused by Corynebacterium pseudotuberculosis

- Chlamydophila abortus (formerly called Chlamydia psittaci)
- Tetanus caused by Clostridium tetani
- Malignant catarrhal fever

Explanation - Enterotoxemia (overeating disease; pulpy kidney disease) is associated with high energy feeding of lambs on pasture or in a feedlot. The best preventive is vaccination two times at 2 to 4 week intervals.

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Question

A group of 60 goats from 6 months to 6 years of age live on a small pasture in the south-east United States, where it is wet and warm for most of the year. The owner has never used any drugs or vaccines in these goats; in fact you are the first veterinarian he has ever consulted. Many of the goats have developed a cough and weight loss, and you note pronounced dyspnea and tachypnea in several of them. You suspect lungworms as the cause of these problems. What test should you run to determine whether lungworms such as Muellerius capillarus are present?

- Fecal sedimentation
- Transtracheal aspiration
- Fecal flotation in sugar
- Baermann examination of feces
- Collect pasture forage sample to culture for worms

Explanation - Baermann examination of feces. This specialized technique will detect **lungworm larvae** in the feces. First stage larvae produced in the lung are coughed up, swallowed, and passed in the feces. On the pasture they go through a snail intermediate host, and the third stage larvae are then ingested with the snail.

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Question

Several kid goats age 10 to 12 weeks on a large goat dairy have developed high fevers, swollen and painful joints, and respiratory signs including tachypnea and dyspnea. One has died, and a post mortem exam reveals fibrinopurulent polyarthritis and interstitial pneumonia. Which is the agent most likely to be the cause of this outbreak?

- Mycoplasma mycoides ssp. mycoides
- Mannheimia hemolytica
- Corynebacterium pseudotuberculosis
- Pasteurella multocida
- Arcanobacterium pyogenes

Explanation - Mycoplasma mycoides ssp. mycoides. The large colony type is responsible for major problems in the US goat population. It can also cause acute septicemia and CNS signs in kids. Carrier goats maintain the infection in a herd, where it is transmitted to kids through milk or colostrum.

.....

Question

A 6-month old lamb presents with a left sided head tilt and spontaneous horizontal nystagmus with the fast phase directed towards the right side. The lamb is not circling. Ventral strabismus is present on the left side and there is drooping of the left upper eyelid and left ear (see image). Which of the following is the most appropriate differential diagnosis list with most likely conditions listed first?

- Otitis media, middle ear trauma, listeriosis, acute gid
- Sarcocystosis, salt poisoning, facial nerve neuritis, meningeal worm infection
- Listeriosis, polioencephalomalacia, acute gid, meningeal worm infection
- Facial nerve neuritis, otitis externa, salt poisoning, polioencephalomalacia

Explanation - Otitis media, middle ear trauma, listeriosis, acute gid. Based on the presentation, there is a vestibular lesion as well as a facial nerve lesion. This can occur commonly with middle ear lesions or brainstem disease.

Unilateral peripheral vestibular lesions are commonly associated with otitis media and ascending bacterial infection via the eustachian tube. Sheep typically present with a head tilt towards the affected side. There may be evidence of otitis externa and a purulent aural discharge in some cases but rupture of the tympanic membrane is not a common route of infection. Pasteurella, Streptococcus, and Arcanobacterium have been isolated from infected lesions. Middle ear trauma can also occur. This is usually treated effectively with procaine penicillin if disease is recognized early.

Listerosis is a bacterial infection usually associated with ingestion of contaminated silage. It usually presents as a bacterial infection limited to one side of the brain. Affected sheep may have unilateral weakness, drooping ear and eyelid, and deviated muzzle. If recognized early, it can be effectively treated with antibiotics (penicillin).

Acute gid (also known as coenurosis) is caused by a tapeworm Coenurus cerebralis which is the larval form of Taenia multiceps. The sheep is an intermediate host and the larva invades the sheep's central nervous system, forming a cyst in the brain.

Polioencephalomalacia usually causes clinical signs that include star-gazing, blindness, and aimless wandering which is less consistent with the clinical description here. It is treated with high doses of thiamine.

Meningeal worms (parelaphostrongylus tenuis) are seen primarily in llamas and alpacas. Sheep can be affected and signs generally include paresis or paralysis although other signs are possible.

Salt toxicity can develop in sheep if a high percentage of mineral supplement is used and water supply is limited. Signs include salivation, increased thirst, vomiting, abdominal pain, diarrhea, ataxia, blindness, and seizures.

Facial nerve neuritis is not an entity in sheep and would not cause the vestibular signs described.

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Question

What is the potential udder fate of goats infected with caprine arthritis encephalomyelitis virus?

- The udder is not affected

- Gangrene
- Hardbag
- Bluebag

Explanation – Hardbag**.** CAEV is a retrovirus and when it affects the udder it will cause fibrosis and result in a firm udder with agalactia. Treatment is ineffective and the goat should be culled. The disease is usually subclinical but can cause arthritis in adults and encephalitis in kids.

Caprine Arthritis-Encephalitis (CAE) – Lentivirus (non-oncogenic retrovirus) of goats. Arthritis in older goats, neurologic diz in goats < 1y.o. Adult dairy goats get chronic arthritis and mastitis. Young get leukoencephalomyelitis, ascending paralysis. Transmitted through milk and colostrum. Most goats are infected young, carry virus and develop years later. Dx by serology, AGID or ELISA. Prevention - feed baby goats pasteurized milk. Test and cull.

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Question

Which of these is not a clinical sign of bluetongue in sheep?

- Teratogenesis
- Lameness
- Seizures
- Profuse nasal discharge
- Edema of the muzzle and face

Explanation - The answer is seizures. Clinical signs of bluetongue result from generalized vasculitis and generally include fever, edema, nasal discharge, crusting around the nose, hyperemic mucous membranes, oral ulcers, pulmonary edema, lameness (from coronitis and myositis), diarrhea, leukopenia, and teratogenesis. Cyanosis of the tongue is how the disease got its name.

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Question

What is the most common site of obstruction in male goats with urolithiasis?

- Internal urethral sphincter
- External urethral sphincter
- Trigone
- Urethral process

Explanation - The correct answer is the urethral process. The most common sites of obstruction in male goats are the urethral process and the distal sigmoid flexure. This is because these regions are narrower intraluminally and are physically predisposed to getting calculi stuck. Other sites including the trigone, ureter, and renal pelvis can obstruct from stones but are less common sites. Even when this obstruction is removed, re-obstruction commonly occurs as more stones leave the bladder.

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Question

Several ewes in a large flock, all of which are in late gestation, have not been able to rise to the standing position. They are being fed good quality grass and alfalfa hay. It is December and the weather is cold. They have reduced feed intake and the most severely affected individuals appear blind and depressed. The physical exam is otherwise not very revealing except that all have significant ketonuria. Which of the following disorders is the most likely and must be ruled out?

- Pregnancy toxemia
- Type 2 ostertagiasis
- Amsinckia toxicity
- Hypomagnesemia
- Liver flukes

Explanation - Pregnancy toxemia is the result of multiple fetuses and insufficient energy intake in late gestation. Cold weather increases energy needs and often precipitates this disorder. Being overweight initially seems to make this disorder more likely. Affected ewes often have low calcium and potassium and high beta-hydroxybutyrate levels.

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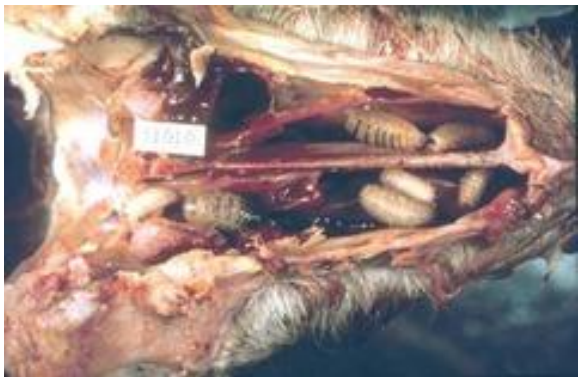
Question

An adult sheep presents with clinical signs of shaking its head, rubbing its nose, and stomping its feet. It has mucopurulent nasal discharge, stridor, and is sneezing. What insect is most likely responsible for this sheep's signs?

- Melophagus ovinus
- Culicoides
- Simulium
- Oestrus ovis
- Tabanus

Explanation - The correct answer is Oestrus ovis. This fly deposits larvae in the nostrils of the sheep using its ovipositor. The larvae migrate up the nasal passage into the dorsal turbinates and sinuses where they develop for weeks before coming out. Excessive infestations result in clinical signs and may elicit a hypersensitivity reaction.



Larvae of Oestrus ovis - sheep nasal bots

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Question

A 5-year old ewe presents as a result of isolating herself. She had just twinned two months ago and she is not vaccinated. On physical examination, she has an enlarged left half of the udder. It is cold, blue, and black (see image). Serosanguinous milk can easily be expressed, and it is foul-smelling. With treatment, what is the prognosis for sheep with this condition?

- Excellent (over 90% of affected sheep recover fully)
- Fair (less than 50% of affected sheep die or are euthanized)
- Good (over 80% of affected sheep will recover and have adequate function)
- Grave (over 80% of affected sheep die or are euthanized)

Explanation - Gangrenous mastitis is caused by **Mannheimia** spp. and **Staphylococcus aureus** and occurs sporadically during the first 3 months of lactation. It is generally associated with poor milk supply related to ewe undernutrition and over vigorous suckling by the lambs.

Despite antibiotic and supportive therapy, the prognosis is grave, and gangrenous udder tissue eventually sloughs leaving a large granulating surface with superficial bacterial infection. The granulation tissue continues to proliferate over the coming months. These ewes are unsuitable for breeding stock. The infected granulation tissue and resultant drainage lymph node enlargement would result in carcass condemnation (and raise genuine welfare concerns). The fleece is very poor because growth has occurred during this period of illness. Affected ewes should be euthanized for welfare reasons at first presentation.

Control measures include ensuring ewes are well fed. Concentrates should be supplied to ewes and lambs when pasture is poor. No ewe should be expected to rear triplets. Teat lesions should be identified and treated with topical antibiotics.

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Question

Several does in a large goat herd, all of which are in late gestation, have not been able to rise to the standing position. They are being fed good quality grass and alfalfa hay. It is December and the weather is cold. They have reduced feed intake and the most severely affected individuals appear blind and depressed, and two have died. On post-mortem examination, your only finding is that they have fatty livers and 4 fetuses each. The physical exam is otherwise not very revealing except that all have significant ketonuria. What steps should be taken to prevent more does from developing this disorder?

- Calcium gluconate IV
- Add magnesium oxide to feed
- Feed anionic diet
- IM dexamethasone
- Increase energy intake

Explanation - About one lb/head/day of good quality grain should be introduced by mid gestation for sheep and goats carrying multiple fetuses. The prognosis for animals already showing clinical signs is poor and treatment is expensive. A C-section can be done, IV glucose administered slowly by drip. This should be followed by rumen transfaunations and feeding 15 to 30 ml propylene glycol every 12 hours, as well as feeding high quality feed.

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Question

What is the most common cause of infectious abortion in sheep in North America?

- Brucella
- Campylobacter
- Leptospira
- Bluetongue virus
- Coxiella

Explanation - Campylobacter infection (or vibriosis) is the most significant cause of abortion in sheep in North America. C. jejuni is the most common and C. fetus is the other main cause of abortion. Other common causes are Toxoplasma and Chlamydia psittaci. Bluetongue is much less common. Brucella ovis rarely causes abortion in sheep although it does cause epididymitis. Sheep are not very susceptible to abortion from leptospirosis. Q fever, or Coxiella burnetii, is an uncommon cause of abortion and is more of concern due to zoonotic potential.

Abortion in Sheep - Most common cause of abortion is campylobacteriosis.

- Campylobacteriosis - Infection via ingestion of organisms. Late-term abortion of edematous fetus; liver with gray necrotic foci. Carrier sheep shed organisms in feces, uterine discharges, aborted fetuses. Culture and ID organism in fetal abomasal fluid and liver. Vaccinate ewes at breeding; booster at second month gestation.
- Toxoplasma gondii – Common. Protozoan; life cycle is completed in the cat. Abortion and still births in sheep, pigs, and goats. White foci in cotyledons, leukoencephalomalacia.
- Chlamydia psittaci – Common. Late-term abortion. Exposure via ingestion, inhalation or venereal. Fetus well-preserved or mummified. Placentitis most consistent finding.
- Leptospirosis - late-term abortions.
- Listeriosis - late-term abortion, birth of weak lambs. Slight to marked autolysis of fetus, fluid in serous cavities, necrotic foci in liver, lung and spleen. Erosions in abomasal mucosa. CNS deficits. Man can be affected.
- Akabane virus disease – arthrogryposis, hydrancephaly.

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Question

What is the toxic principle behind moldy sweet potatoes causing atypical interstitial pneumonia in sheep and goats?

- Perilla mint ketone
- 4-Ipomeanol
- 3-methyl indole
- D,L-tryptophan

Explanation - The correct answer is 4-Ipomeanol. Basically, there **are 3 similar plant toxicities of sheep** and goats. They are perilla mint, moldy sweet potatoes, and brassica plants (rape, kale, turnip tops). Perilla mint ketone is metabolized to a toxic intermediate that damages Type I pneumocytes and bronchiolar epithelial cells. Moldy sweet potatoes have Fusarium solani which produces the mycotoxin 4-Ipomeanol, which causes similar damage. Brassica plants contain large amounts of D,L-tryptophan, which is converted in the rumen to 3-methyl-indole, which is also metabolized to a similar toxic intermediate.

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Question

A farmer comes to you because many of his sheep are dying acutely. You perform a necropsy which shows dark blue, hemoglobin filled kidneys. This is most consistent with what condition of sheep?

- Iron deficiency
- Urea toxicity
- Copper toxicity
- Leptospirosis

Explanation - The correct answer is copper toxicity. Sheep are highly susceptible to copper toxicity. Because this causes an acute hemolytic crisis, the most common signs are acute death, icterus, depression, hemoglobinuria, increased respiratory rate, and weakness. Pathology often shows dark, hemoglobin filled kidneys ("gun metal blue"). Goats and cattle are less susceptible to copper toxicity.

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Question

What is the gestation length of a goat?

- 100 days
- 200 days
- 150 days
- 125 days

Explanation - The correct is answer is 150 days.

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Question

The owner of a large flock of goats in the volcanic NE corner of California brings you two 2-month old kids that have died last night. He tells you that about 8 to 10 have died recently, and the only signs he sees are weakness and stiffness in some of them. You perform a post mortem and find pale white streaks in bundles of skeletal muscle of the limbs and diaphragm. Which disease is this most likely to be?

- Sarcocystosis
- Nutritional myodegeneration
- Bluetongue
- Clostridial myopathy
- Myotonia

Explanation - Also known as white muscle disease, nutritional myodegeneration is caused by selenium and vitamin E deficiency. This disorder can strike mainly the heart or skeletal muscles. It occurs where soils are low in selenium, such as volcanic soils, and where green forage is scarce and vitamin E levels are low. Prevention is by supplementing these substances.

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Question

Spider lamb syndrome is caused by _____.

- Chlamydia
- Lupine
- Skunk cabbage
- Semilethal autosomal recessive gene

Explanation - The correct answer is a semilethal autosomal recessive gene. Another name for Spider Lamb Syndrome is Ovine Hereditary Chondrodysplasia. Lupine may result in arthrogryposis if consumed during gestation. Chlamydia will usually cause abortions. Skunk cabbage (Veratrum californicum) causes craniofacial deformities if consumed by ewes on the 14th day of gestation. If the plant is consumed at approximately 30 days of gestation, you will see limb and bone shortening in the metacarpal and metatarsal joints.

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Question

What are the two main clinical syndromes of caprine arthritis encephalitis virus and what age goats are affected?

- Granulomatous encephalitis in goats over 2 years of age and arthritis in newborn goat kids
- Leukoencephalomyelitis of kids 2-6 months old and polysynovitis-arthritis in goats 6 months or older

- Leukoencephalomyelitis in goats older than 6 months and polysynovitis-arthritis in goat kids 2-6 months of age
- Granulomatous encephalitis in newborn goat kids and arthritis in goats over 2 years of age

Explanation - The correct answer is leukoencephalomyelitis of kids 2-6 months old and polysynovitis-arthritis in goats 6 months or older. Does affected may have some mammary gland involvement and develop a hard fibrous udder, which results in decreased milk production. Less commonly, goats may have an interstitial viral pneumonia. CAEV is primarily transmitted to kids via milk or colostrum.

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Question

A herd of line-bred registered Anglo-Nubian goats has had several kids born with abnormalities in the last year, and the owner asks you to investigate. The abnormalities reported include inability to stand since birth, short sternum, shortened and domed head with short curled ears, head tremor, and carpal contractures. They have no suck reflex. Based on these clinical signs, what condition should you suspect?

- Lead poisoning, in utero
- Locoweed poisoning, in utero
- Beta mannosidosis
- Congenital Neospora caninum infection
- Congenital bovine viral diarrhea infection

Explanation - Storage diseases and inborn errors of metabolism can result in intraneuronal accumulation of some indigestible metabolic products, in this case mannose-based oligosaccharides. Beta mannosidase deficiency occurs as a genetic disorder in Anglo-Nubian goats and Salers calves. The plasma level of the enzyme can be tested and is zero in affected goats. Alpha mannosidosis occurs in a number of breeds of cattle.

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Question

The carrier and reservoir of the herpes virus responsible for causing malignant catarrhal fever (MCF) in cattle in North America is chiefly the _____?

- Sand flies
- Culicoides sonorensis (a midge)
- Wildebeest
- Sheep
- Cattle persistently infected as a fetus

Explanation - A high percentage of normal appearing sheep in North America are infected with MCF virus. Wildebeests are the reservoir of the African form of MCF.

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Question

A male goat presents for vocalizing and straining to urinate. He has been kicking at his abdomen. You detect crystals adherent to the hairs around the prepuce (see image). What condition should you suspect and try to rule out first?

- Acute severe pyelonephritis
- Upper intestinal obstruction
- Lower intestinal obstruction
- Urinary tract obstruction

Explanation - The correct answer is urinary tract obstruction due to calculi. This should be suspected in all male and castrated male goats (and sheep) with non-specific signs of disease or discomfort because it is so common. Common clinical signs associated with urinary tract obstruction are vocalization and dribbling of urine. Heaving or forceful abdominal contractions may be seen. Hematuria, dysuria, prolonged urination, and apparent abdominal pain are also common signs. The most important step of evaluation is exteriorization of the penis and examination of the urethral process because this is the most common site of blockage. In severe cases the entire urethra may be filled with calculi.

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Question

A mature pet goat is brought to you for diagnosis and treatment one morning. The owner found the wether in the feed room eating a bag of horse sweet feed (grain and molasses) some 3 hours ago. His abdomen is large and full. On examination you, note that his T=101F, HR=120, RR=42, and his rumen is overfull with watery fluid. The goat is either a very quiet pet or is depressed, as he stands in place with no restraint and lies down as soon as he can (see photo). You pass a stomach tube and take a sample of rumen fluid and it has a pH of 4.5. Based on this history and PE findings, which of the following treatments would be most effective?

- Transfaunate with normal rumen contents; SQ 7% sodium bicarbonate; SQ tetracycline
- Oral antacids containing magnesium hydroxide; IV 50% glucose; IM tetracycline
- Oral antacids containing sodium bicarbonate; IV fluids containing sodium and chloride (saline); diuretics such as furosemide
- Oral vinegar; IV saline; oral penicillin
- Oral antacids containing magnesium oxide and magnesium hydroxide; IV fluids containing sodium bicarbonate; systemic penicillin

Explanation - Oral antacids containing magnesium oxide and magnesium hydroxide; IV fluids containing sodium bicarbonate; systemic penicillin. This goat has a classic history for grain overload, and the PE is compatible with rumen acidosis and metabolic acidosis. If not promptly and aggressively treated, this can result in death from metabolic acidosis and dehydration, as well as liver abscesses and mycotic rumenitis. Oral antacids, systemic buffers, and penicillin are all indicated. The safest effective oral antacids are MgO and MgOH. In some cases, a rumenotomy may also be indicated.

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Question

Dehorning can sometimes lead to sinusitis, except in very young kids. Which sinus is most frequently involved?

- Frontal sinus
- Infraorbital sinus
- Pharyngeal sinus
- Turbinate sinus
- Maxillary sinus

Explanation - Dehorning most commonly causes sinusitis of the frontal, while dental disease may result in maxillary sinusitis. There is no infraorbital sinus, turbinate sinus, or pharyngeal sinus. There is a turbinate portion of the frontal sinus.

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Question

You are called out to examine a sick cow. The cow is dyspneic and has bright red mucous membranes. You suspect the cow has ingested which of the following cyanide-containing plants?

- Common groundsel
- Fiddleneck
- Ragwort
- Chokecherry

Explanation - The correct answer is chokecherry. This is a cyanide-containing plant and can cause dyspnea, staggering, and death. Bright red mucous membranes are commonly seen due to the result of the cyanide interfering with the electron transport chain (binds to cytochrome oxidase); hemoglobin is unable to release oxygen. For some reason, the GI tract has a bitter almond smell on necropsy. All other answer choices are pyrrolizidine alkaloid plants.

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Question

An owner of a well managed goat herd has just contacted you because 7 of his best goats have died acutely in a period of 3-5 days. The goats are being fed good quality alfalfa hay plus grain. The clinical signs observed were diarrhea, hyperesthesia, head-pressing, opisthotonos, dorsomedial strabismus, odontoprisis, and four of them behaved as though they were blind. All goats are up to date on vaccinations

and there have been no new additions to the herd. The only recent managerial change was an increase in the amount of grain fed. What is the most likely diagnosis?

- Polioencephalomalacia
- Citrullinemia
- Lead poisoning
- Vitamin A deficiency

Explanation - The correct answer is polioencephalomalacia. The history should lead you to this answer as long as you remember that grain feeding can result in thiaminase-producing bacteria such as Bacillus thiaminolyticus multiplying in the rumen to destroy thiamine and cause polio. It also makes sense that the strongest animals get sick first because they are at the top of the "food chain" compared to their herd mates and will eat all the food they want first. Citrullinemia is a rare genetic storage disorder in some lines of Holstein calves. Vitamin A deficiency is unlikely in animals receiving good quality hay. Lead poisoning, although associated with similar clinical signs, is unlikely in a well managed herd.

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Question

Gossypol toxicity in young ruminants can cause sudden death as result of a _____.

- Hepatopathy
- Cardiomyopathy
- Coagulopathy
- Neuropathy

Explanation - The correct answer is cardiomyopathy. Another possibly correct answer is hepatopathy, since gossypol also affects the liver. However, sudden death is most likely from cardiac toxicity and secondary pulmonary edema.

An example of a toxin causing a neuropathy would be organophosphates, metaldehyde, astragalus or oxytropis.

An example of a toxin causing a coagulopathy would be bracken fern or sweet clover.

An example of a toxin causing a hepatopathy would be fiddleneck (amsinkia), senecio, or ragwort.

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Question

You are asked to perform a post mortem examination on a 2-year old sheep recently moved to a feedlot after giving birth to twins in the early summer. The farmer noted no signs of illness prior to finding the sheep acutely dead in the morning. An image of the gross post-mortem finding is shown below. You note widespread necrosis of the small intestine with fetid smelling contents. No volvulus is seen. You evaluate the urine and find glucosuria. There is softening of the brain and kidney tissues. Which of the following management considerations should you look into?

- Evaluate herd vaccination program and diet
- Evaluate vector control program and shearing protocols
- Evaluate the density of the herd and other causes of stress
- Evaluate pasture for toxic plants and the medication history of the flock
- Evaluate breeding soundness evaluation program and quarantine program for newly introduced sheep

Explanation - You should be suspicious of type D Clostridial enterotoxemia (pulpy kidney disease) based on the acute mortality and necropsy lesions in the intestines. Additional findings consistent with enterotoxemia are the glucosuria and soft kidneys. Enterotoxemia is sometimes referred to as overeating disease because of its association with changes in diet to concentrates or higher grain concentrations. It is also sometimes referred to as pulpy kidney disease because of the changes that occur to the kidneys.

Enterotoxemia caused by Colostridium perfringens type D affects sheep and goats of all ages (from 1 week to several years of age).

A diagnosis of enterotoxemia is suggested when the sudden death of concentrate-fed animals that have not been vaccinated for Clostridium perfringens type D occurs.

In young animals, this commonly occurs after abundant nursing or grazing on improved pastures, high quality hays and/or concentrates/grains. In older animals as in this case, the disease corresponds with the finishing or feedlot period and is often associated with a high grain diet. Enterotoxemia is one of the most common causes of death in feeding lambs.

Prevention depends on vaccination against Clostridial toxoid and avoiding rapid changes in diet

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Question

Several kids are noted to be extremely lame and febrile. On physical exam you palpate markedly swollen joints. There are no adults noted to be lame or show any similar clinical signs. What is the most likely diagnosis?

- Pasteurella multocida
- Clostridium novyi
- Mycoplasma mycoides ssp. mycoides
- Erysipelothrix

Explanation - Mycoplasma mycoides ssp. mycoides (large colony type) in kids will result in the clinical signs described. Sometimes pneumonia is also a prominent part of the syndrome. Age of onset is usually at 2-4 weeks, and treatment consists of tetracyclines. Prognosis for a complete recovery is guarded, and animals may become carriers. The disease is contagious and usually introduced by a mammary carrier, which is subclinical. This agent can also cause mastitis in does.

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Question

What causes enzootic ataxia in goats and sheep?

- Iron deficiency
- Neospora caninum
- Magnesium deficiency
- Copper deficiency

Explanation - Copper deficiency can be primary (due to low copper intake) or secondary (due to high molybdenum, sulfur, iron, selenium, zinc, or other factors which inhibit absorption and promote excretion of copper). Copper deficiency can cause a number of signs including microcytic anemia, decreased production, faded hair, heart failure, infertility, swollen joints, gastric ulcers, and diarrhea. The two neurologic diseases that are specific to copper deficiency are enzootic ataxia (seen in lambs 1 to 2 months old) and swayback (seen congenitally or in very young lambs and kids). Clinical signs of progressive ascending paralysis are incoordination, muscle atrophy, and weakness. Copper deficiency leads to less myelin formation and to demyelinization.

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Question

A herd of goats has recently experienced several animals with CNS signs including not herding with the group, appearing blind, and having anorexia and hypermetria. One goat had developed dorsomedial strabismus and teeth grinding; it went on to become comatose and had periodic tonic-clonic convulsions before it died. Postmortem reveals cerebrocortical necrosis (polioencephalomalacia). What treatment should be used on the next animal to appear with these signs?

- Tetracycline IV
- Thiamine injections
- Selenium orally
- Phosphorus orally
- Penicillin orally and IV

Explanation - The disease has many factors, including dietary, that should also be addressed, but the single best treatment is to give thiamine. Convulsions can also be controlled by diazepam or phenobarbital. Thiamine should be diluted and given either SQ or very slowly IV.

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Question

A goat herd is diagnosed with having Mycoplasma mycoides ssp. mycoides. What should you tell the owner to do?

- Treat with appropriate antibiotics

- Cull all culture positive animals and affected kids.
- Only keep the kids and cull adults
- Isolate all affected animals for six months

Explanation - The correct answer is to culture milk from all does and cull positive culture animals and affected kids. There is no effective therapy for Mycoplasma mycoides ssp. mycoides. Keeping the kids in the face of an outbreak is not recommended because they may become carriers. Isolating for six months will do no good because there may be carriers.

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Question

Several young goats under one year of age in a herd of 50 goats have scabby lesions around their mouths and noses, as shown in the photo. They also have low-grade fever and appear reluctant to eat hay, so they are falling behind the group. The owner is concerned because this condition appears to be spreading. You examine three affected kids and find that under the scabs is what appears to be proliferative granulation tissue. You advise the owner that the diagnosis is _____?

- Bovine papular stomatitis
- Foot-and-mouth disease
- Pseudocowpox
- Contagious ecthyma
- Malignant catarrhal fever

Explanation - Also known as orf or soremouth, this parapoxvirus disease is common in lambs and kids. Humans can also be affected. Rarely fatal, it nonetheless can make affected kids or lambs end up smaller than their age mates. Lesions occasionally also occur on the teats of the dams. The scabs dry up in 2 to 4 weeks and fall off, with the virus overwintering in the scabs on the ground until more susceptible animals appear next year.

Contagious Ecthyma - aka Contagious Pustular Dermatitis, Sore Mouth, Orf. Parapoxvirus, related to pseudocowpox and bovine papular stomatitis. Infectious dermatitis of sheep and goats transmitted by direct contact, usually in young. Goats > sheep. Organism is highly resistant to dessication. Lesions on skin of lips with extension into oral mucosa, also on feet, interdigital regions. Vaccination. Once recovered usu highly resistant. **ZOONOTIC**, vets and sheep handlers lesions on hands, face usu more proliferative, distressing.

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Question

A 2-year old registered Suffolk sheep has developed weight loss, nervousness, and pruritus, resulting in loss of much of its wool (see image). It has recently developed ataxia and teeth grinding. On the basis of these clinical signs you make a tentative diagnosis of scrapie. If scrapie is confirmed, what is the best approach to managing the flock?

- Use corrals and pastures where the affected animal had been only for lambs under a year of age for the next year
- Treat affected animals for 2 weeks with IM tetracyclines
- Cull positive animals and treat all others in the flock with immunostimulants
- Use stem cell therapy to insert the PrP gene into affected animals and related animals
- Cull positives and breed for resistant flock based on pedigree

Explanation - Scrapie is a spongiform encephalopathy, caused by a prion. The PrP gene appears to play a role in susceptibility. Using known pedigrees (breed only unaffected animals) or genetic testing, a resistant or less susceptible flock can be bred. Affected and related animals should be culled and destroyed, as the prion may otherwise spread the disease.

Scrapie – Prion. Sheep (Goat = Bovine Spongiform Encephalitis, Mad Cow Disease). Prolonged incubation. Severe pruritus, CNS, emaciation, death. No treatment. **Reportable**. Creutzfeldt-Jakob disease in humans?

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Question

A goat owner brings you an animal for a post mortem. The 2-year old goat was purchased as a one-year old and since kidding 3 months ago has lost most of its muscle mass, was weak, and was not lactating effectively. Another goat has started to show the same signs and the owner is concerned about it spreading to his other 90 dairy goats. On post mortem the only abnormalities you find are the bowel mucosa is thickened in the ileocecocolic area, and the mesenteric lymph nodes are dark and enlarged (see photo). What is your diagnosis?

- Mycoplasma mycoides
- Salmonellosis
- Chronic wasting disease
- Caprine lymphoma
- Paratuberculosis (Johne`s disease)

Explanation - Caused by Mycobacterium avium ssp. paratuberculosis, this disease may not cause obvious diarrhea in goats, but the gut lesions result in loss of albumin into the gut, and weight loss can be rapid and marked. The granulomatous bowel looks thickened and the lymph nodes enlarged. The other answer choices do not typically result in the classic histopathological change.

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Question

Lameness in sheep and goats due to infectious footrot is associated with wet conditions. What microorganism is considered essential for the disease to occur?

- Dichelobacter nodosus
- Brucella ovis
- Campylobacter jejuni
- Corynebacterium pseudotuberculosis
- Fusobacterium necrophorum

Explanation – The correct answer is Dichelobacter nodosus, formerly called Bacteroides nodosus, this organism is the key to diagnosing infectious (contagious) footrot. Fusobacterium necrophorum is also often present as a secondary invader in cases of footrot.

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Question

You are called to a goat dairy in Mississippi and asked to perform a postmortem on several 3- to 5-month old kids, which are pale. You note that the abomasum contains many Haemonchus contortus. Other animals of various ages appear anemic (pale, rapid HR, and weak). The owner has been treating all her goats with fenbendazole at two-month intervals for several years now. What is the explanation for this anemia likely to be?

- Vitamin B12 deficiency
- Hypobiotic larvae
- Copper deficiency anemia
- Resistant parasites
- Iron deficiency anemia

Explanation - Haemonchus is a blood sucker and causes anemia. Haemonchus, Ostertagia, and some other trichostrongyles can become resistant to anthelmintics. In addition, some anthelmintics are not as effective against hypobiotic larvae. You should recommend several management changes and use a new anthelmintic such as ivermectin.

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Question

Which of the following organisms is known to be a blood sucker of the abomasum in sheep and goats?

- Haemonchus contortus
- Ostertagia ostertagii
- Fasciola gigantica
- Strongyloides spp

Explanation - The correct answer is Haemonchus contortus. Ostertagia is not considered a blood sucker; instead this organism invades the abomasal wall. Strongyloides spp are intestinal threadworms that migrate to the intestines by first penetrating the oral mucosa or the skin, entering the bloodstream, and then heading for the heart. Afterward, they travel to the lungs and trachea, where they are swallowed and enter the intestines. Fasciola gigantica is a liver fluke.

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Question

You are called to a small goat dairy to examine three ill does, which are in the final stages of late pregnancy, have stopped eating, and appear to be weak. One has actually died just before you arrived, and you perform a post mortem exam on her. You are amazed to find 5 dead near-term fetuses inside, as well as a pale fatty liver (see photo). Based on this and the appearance of the others, you check their urine and find ketones. What is your diagnosis?

- Gossypol toxicity
- Hypocalcemia
- Pregnancy toxemia
- Hypomagnesemia
- Hepatotoxicity

Explanation - Multiple fetuses can become a space-occupying lesion, making the rumen more difficult to fill, just as the doe requires maximum caloric intake. As she tips over into negative energy balance, utilizes her omental fat stores and develops a fatty liver, she becomes keto-acidotic and develops pregnancy toxemia. To be saved, the other affected animals must have IV glucose and an immediate C section, followed by excellent nutritional support. They may also need calcium, magnesium and other electrolytes.

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Question

What are the reservoirs of the African form and the N. American form of malignant catarrhal fever (Alcephaline herpesvirus 1 and Ovine herpesvirus 2 respectively)?

- Horse and zebra
- Wildebeest and sheep
- Pig and cattle
- Gazelle and goat

Explanation - Wildebeest carry the African form and sheep carry the N. American form. This disease occurs sporadically in cattle but can occur as outbreaks. Bison are very susceptible, and bison herds in North America have experienced outbreaks. Clinical signs involve acute generalized arteritis which involves the mucosa of many systems, leading to diarrhea, thickened abnormal skin, cloudy corneas etc. In these cases, high fever, respiratory and gastrointestinal lesions can be expected. Marked lymphadenopathy is also observed. The African form will result in a higher mortality (AHV 1). Lambing sheep are thought to be a potential source of infection for cattle.

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Question

A pet pygmy goat wether presents at your clinic with a complaint of restlessness, teeth grinding, vocalizing, stretching out, and straining. When you tickle the preputial opening, only a drop of urine appears. The wether has tachypnea and tachycardia, and is mildly bloated (see image). When you palpate the abdomen externally using both hands, you detect a large turgid structure in the caudal abdomen. What is the most likely correct diagnosis?

- Urolithiasis
- Acute pyelonephritis
- Traumatic reticuloperitonitis
- Ulcerative posthitis
- Prostatic abscess

Explanation - These clinical signs in a male or wether sheep or goat should be attributed to urinary tract obstruction from a stone until proven otherwise. The large turgid structure is the distended urinary bladder. A number of treatment options and preventions are possible, depending on the type of stone.

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Question

Which cranial nerve is most responsible for tear production?

- CN V
- CN III
- CN VII
- CN II

Explanation - The correct answer is CN VII. The lacrimal nerve from cranial nerve VII innervates the lacrimal gland, which is located within the orbit. It is responsible for production of much of the aqueous portion of the tear film. For this reason, if an animal has signs of facial nerve problems, tear production should be checked.

.....

Question

What is the usual route of transmission of Mycoplasma pneumonia in sheep?

- Fecal-oral
- Transplacental
- Transmammary
- Aerosol

Explanation - The correct answer is aerosol. Mycoplasma pneumonia, also referred to as enzootic pneumonia or atypical pneumonia, is caused primarily by Mycoplasma ovipneumoniae in sheep. It is usually spread from older animals to younger animals by the respiratory route (aerosol). Note that this route is in direct contrast to transmission in goats which have a different species of Mycoplasma (M mycoides ssp mycoides) that is primarily spread in milk.

.....

Question

A goat rancher has been having recurrent issues with urinary stones and obstruction in his goats as seen in the postmortem image here of one of his goat's bladders. Which of the following is a major risk factor associated with development of urolithiasis and urethral obstruction?

- Dry weather
- Female gender
- Vaccination status
- Urinary tract infection
- Lack of castration

Explanation - Water intake is an important risk factor associated with urolithiasis in small ruminants. Therefore, dry weather, unpalatable water, and freezing temperatures all predispose to urolithiasis.

Castration increases the risk for urethral obstruction because it results in smaller urethral diameter at maturity. Obstruction of the urethra is rare in females. The other major risk factor for urolithiasis is dietary mineral imbalance.

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Question

This suture is broken down via phagocytosis.

- Nylon
- Catgut
- Maxon
- Vicryl
- Polydioxanone (PDS)

Explanation - The correct answer is catgut. Catgut is broken down by phagocytosis and retains tensile strength for 14-28 days. Nylon is a non-absorbable suture. Vicryl, maxon, and PDS are broken down via hydrolysis.

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Question
You are presented with a 4-year old Saanen milk goat with the complaint of lesions on her udder (see image). They had only been warts until recently. Several other goats in her cohort, all good milkers, have warts on the teats. What is the diagnosis?

- Corynebacterium pseudotuberculosis
- Squamous cell carcinoma
- Mycobacterium leprae
- Caprine herpes mammillitis
- Mycobacterium capri

Explanation - Papillomas in Saanen goats tend to transform to squamous cell carcinoma for poorly understood reasons. **The prognosis is poor for dairy goats**.

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Question

What bacteria are most commonly associated with ulcerative posthitis (pizzle rot) in rams?

- Brucella ovis
- Pseudomonas aeruginosa
- Pasteurella multocida
- Corynebacterium renale
- Klebsiella pneumoniae

Explanation - The correct answer is Corynebacterium renale. This bacterium contains a urease which allows it to thrive in the environment of the prepuce and converts urea to ammonia which damages mucosal surfaces and leads to the clinical signs of swelling of the prepuce and stranguria.

Ovine Posthitis, Corynebacterium renale

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Question

There are five main gastrointestinal parasites of major importance in small ruminants, including Cooperia spp, Nematodirus spp, Trichostrongylus axei, and Telodorsagia circumcincta. Name the fifth and often most important GI parasite of sheep and goats in moderate, warm, wet climates.

- Ascaris lumbricoides
- Haemonchus contortus
- Ostertagia ostertagi
- Dictyocaulus viviparus
- Muellerius capillaris

Explanation - H. contortus is a blood sucker and causes anemia and hypoproteinemia. Young sheep and goats, pregnant or nursing females, and animals in a low plane of nutrition are most susceptible. Ostertagia is often an important GI parasite of cattle.

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Question

You examine a sheep with thick brown-black crusts around the commissures of the mouth, in the oral cavity, and the feet, eyelids and teats. The sheep handler also has lesions on his fingers. What is the most likely cause of their lesions?

- Scrapie
- Foot-and-mouth disease
- Vesicular stomatitis

- Contagious ecthyma

Explanation - The correct answer is contagious ecthyma. These are the classic lesions for this condition, also known as orf or soremouth. It is caused by a parapoxvirus and is zoonotic. Scrapie causes pruritus and secondary skin lesions, not the type of lesions and distribution described. Vesicular stomatitis and FMD both primarily cause vesicular lesions.

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Question

Which of these routes are likely methods of transmission of Mycoplasma pneumonia in goats?

- Transplacental and fecal-oral
- Via blood transfusion and urine contamination
- Venereally and via insect vector
- Transmammary and aerosol

Explanation - The correct answer is transmammary and aerosol. In goats, Mycoplasma pneumonia is caused by the Mycoplasma mycoides subspecies mycoides (large colony type) and M. capricolum. The organism is transmitted orally to kids through contaminated milk or colostrum. In adults, it is thought to be transmitted through the external auditory meatus or direct inhalation. The incubation period is approximately 6-10 days but can be up to several weeks. Affected animals will typically show signs of respiratory disease (fibrinous pneumonia).

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Question

There is an outbreak of lesions in the interdigital region in sheep at a local ranch. The owner wants help with recommendations on how to control and prevent further outbreaks. Which of the following would be BAD (incorrect) advice?

- Do not place sheep in wet or muddy areas
- Isolate or cull infected animals
- Perform regular foot trims
- Provide 90% zinc sulfate foot baths

Explanation - You would only want to recommend 10% zinc sulfate foot baths. 90% is too much and can result in toxicity. Isolating or culling the animals is not bad advice since footrot is so contagious among sheep. Remember, the two most common causative agents of footrot in sheep are Fusobacterium necrophorum and Dichelobacter nodosus.

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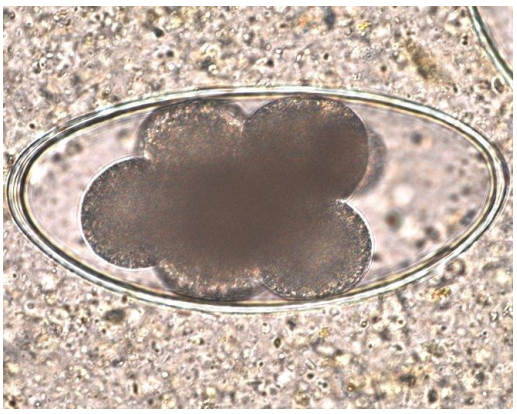
Question

Several of the young (6-10 week old) lambs in a flock have developed profuse watery diarrhea and anorexia with weight loss and dehydration. The fleece appears dull and coarse. On fecal evaluation, you detect many of the eggs shown in the image below (the egg is approximately 150 um long). Which of the following is an appropriate treatment?



- Praziquantel
- Metronidazole
- Amprolium
- Oxytetracycline
- Levamisole

Explanation - Nematodirus eggs have a characteristic elliptical appearance with sharply curved poles and 2-8 blastomeres surrounded by a wide fluid-filled cavity. Diagnosis can be difficult during the prepatent period when there may be little egg shedding.

Levamisole is an imidazothiazole derivative that is effective against gastrointestinal roundworms and lungworms in sheep (Haemonchus, Trichostrongylus, Ostertagia, Cooperia, Nematodirus, Bunostomum, Oesophagostomum, Chabertia, Dictyocaulus. It is not effective against tapeworms and flukes.

Commonly used sheep anthelmintics include albendazole, fenbendazole, ivermectin, levamisole, oxfendazole, and thiabendazole.

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Question

What is the cause of grass tetany in goats?

- Magnesium toxicity
- Mycotoxins
- Calcium deficiency
- Magnesium deficiency
- Copper deficiency

Explanation - The correct answer is magnesium deficiency. Magnesium is important for nervous system function and many enzymatic reactions. The skeletal reserves of magnesium are much smaller than the calcium reserve. Magnesium deficiency leads to grass tetany. Magnesium toxicity is rare. Grass tetany usually occurs in lactating animals in the early spring on pastures that are well-fertilized with nitrogen and potassium, because high levels of these inhibit magnesium absorption from the GI tract. Copper deficiency causes enzootic ataxia. If you chose mycotoxins, you were probably thinking of grass staggers, which is a different disease.

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Question

You examine a herd of sheep and find that many sheep have proliferative, crusting lesions of the mucocutaneous junctions of the mouth and nose. They are otherwise relatively healthy, although some of the nursing females have similar lesions on their udders. The farmer reports that many of his sheep have had these before and that it eventually just goes away. What is the most likely diagnosis?

- Foot-and-mouth disease
- Contagious ecthyma
- Vesicular stomatitis
- Bluetongue

Explanation - The correct answer is contagious ecthyma. FMD, VSV, and bluetongue cause vesicles and ulcers rather than proliferative, crusting lesions and usually will have other systemic signs as well; also, they are unlikely to recover spontaneously. Contagious ecthyma is a zoonotic poxvirus.

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Question

What is the most common bacterial cause of infectious pneumonia in sheep and goats?

- E. coli

- Pasteurella multocida
- Mannheimia hemolytica
- Corynebacterium pseudotuberculosis

Explanation - The correct answer is Mannheimia hemolytica, formerly called Pasteurella hemolytica. Mannheimia pneumonia is the most common infectious bacterial disease of sheep and goats. Most cases are caused by M. hemolytica type A. A variety of predisposing factors are suspected. Clinical signs include fever, depression, mucopurulent nasal discharge, coughing, pulmonary crackles and wheezes, and tachypnea. Necropsy lesions are **fibrinopurulent pleuropneumonia**.

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Question

A 1-month old female alpaca presents to you for difficulty breathing and difficulty nursing. On your physical exam, you note that the cria is open mouth breathing. You also note that it has extra digits. What is the most likely diagnosis?

- Guttural pouch empyema
- Parelaphostrongylus tenuis (meningeal worm)
- Congenital hepatic lipidosis
- Choanal atresia
- Nasopharyngeal polyp
- Guttural pouch emphysema

Explanation - There may be a few questions on camelids on your board exam. There are a few diseases that are specific to them that are worth knowing a little bit about for your exam including choanal atresia and meningeal worm infections.

Choanal atresia is **one of the most common congenital defects in alpacas**. It occurs when the normal opening between the nasal and pharyngeal areas is blocked by membranous tissue and/or bone. Signs of this condition are labored breathing, prolonged and difficult expiration, open-mouthed breathing, choking and gagging while nursing, cyanosis, weakness, lack of weight gain, and aerophagia.

Euthanasia is typically recommended, as the prognosis is poor even with surgical correction. These animals frequently have additional congenital abnormalities such as polydactyly, cardiac, renal or reproductive organ defects.

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Question

Enzootic pneumonia and gangrenous mastitis in sheep (blue bag) can both be caused by _____.

- Pasteurella multocida
- Mannheimia hemolytica
- Mycoplasma mycoides
- Staphylococcus aureus
- Fusobacterium necrophorum

Explanation - The correct answer is Mannheimia hemolytica. This is a difficult question, but it is important to know the major diseases caused by each of these bugs. Mannheimia hemolytica (formerly Pasteurella hemolytica biotype A...it takes several years for boards to catch up with nomenclature, so you should remember this name too) causes blue bag and enzootic pneumonia which is a hemorrhagic bronchopneumonia of young lambs and their dams. Pasteurella multocida causes primarily pneumonia and septicemia. Fusobacterium causes necrotic fetid lesions of the mouth or feet. Staphylococcus aureus is a cause of blue bag and arthritis. Mycoplasma mycoides ssp mycoides causes a number of conditions including pleuropneumonia, mastitis, polyarthritis, and meningitis, but is **seen mainly in goats**. The Mycoplasma that causes pneumonia in sheep is Mycoplasma ovipneumoniae. If you knew all of this, you are on top of your small ruminant infectious diseases.

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Question

Infection of the pregnant ewe with what virus can result in lambs that have dark and hairy fleece around the head and shoulder that grow poorly and tremor?

- Akabane virus
- Bluetongue virus
- Cache Valley Virus
- Border disease virus

Explanation - The correct answer is border disease virus. Ewes infected during gestation can have lambs that are aborted, macerated, or mummified but surviving ones may exhibit the "**hairy shaker**" syndrome described due to infection of hair follicles and the cerebellum. The other viruses listed can cause abortions but cause different signs in the lambs.

Bluetongue can cause **hydranencephaly**.

Akabane can cause dystocia and **arthrogryposis**.

Cache Valley virus can cause **brachygnathia**, **hydranencephaly**, **microencephaly**, and spinal cord hypoplasia.

.....

Question

A sheep presents to you with a history of rubbing its wool raw in areas along the lumbar regions. The sheep has had substantial weight loss in the past few months and has become quite fractious. What is the most likely diagnosis?

- Scrapie
- Rabies
- Bacterial meningitis
- Listeria monocytogenes

Explanation - The correct answer is scrapie. Scrapie is an afebrile, chronic, progressive, degenerative neurologic disease. It is one of the transmissible encephalopathies (like mad cow disease) caused by a prion. Clinical signs depend on the regions of the brain that are affected but usually include behavior changes including aggressiveness, failure to herd, unsteady gait, floppy ears, self-mutilation (pruritus), and in end stages, blindness, seizures, and an inability to swallow. Rabies is a differential for this sheep although clinical signs of rabies are usually more rapid in progression, with an ascending paralysis. However, aggression and any other neurologic signs can be seen with rabies. Bacterial meningitis in sheep is frequently associated with tail docking and presents as a progressive ascending paralysis. Neck pain is also frequently present. Clinical signs of listeriosis are usually loss of the ability to eat, dehydration, and often asymmetrical cranial nerve V or XII signs, including dropped jaw, loss of saliva, and dysphagia.

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Question

How many permanent teeth do sheep have?

- 40
- 44
- 30
- 32

Explanation - The correct answer is 32. Ruminants have 2(I 0/4, P 3/3, M 3/3). Pigs have 44 permanent teeth. Horses have between 40-42 permanent teeth. Dogs also have 42 permanent teeth. Cats have 30 permanent teeth.

.....

Question

A 1-year old pet wether sheep presents at your clinic with a complaint of restlessness, teeth grinding, vocalizing, stretching out, and straining. When you tickle the preputial opening, only a drop of urine appears. The wether has tachypnea and tachycardia, and is mildly bloated. When you palpate the abdomen externally using both hands, you detect a large turgid structure in the caudal abdomen; you diagnose urethral obstruction due to urolithiasis. You sedate the sheep and extrude the penis, where you find several stones in the urethral process and amputate it (see image of amputated process). The animal is still unable to urinate. What is the best treatment option for this pet now?

- Bladder marsupialization
- Xylazine and intravenous fluids
- Tube cystostomy
- Perineal urethrostomy
- Penectomy

Explanation - Using local anesthesia, a Foley catheter is inserted percutaneously into the bladder immediately in front of the pubis and sutured in place. This option allows the urine to drain, and the relief often allows the urethal stones to pass. After one or two weeks the animal may once again be able to urinate through the urethra, and the catheter can be removed. The stone type should be determined by analysis and a corrective dietary measure initiated. The other surgical treatments listed are less likely to have favorable long term outcomes and are considered salvage procedures; the other medical treatments would likely result in a ruptured bladder.

.....

Question

A sheep presents to you for nasal discharge and face rubbing. You perform cytology on the copious discharge and note numerous eosinophils and mast cells. What is the most likely diagnosis?

- Melophagus ovinus infestation
- Actinomyces sinusitis
- Sheep diphtheria (Fusobacterium necrophorum)
- Enzootic nasal tumor
- Oestrus ovis infestation

Explanation - The correct answer is Oestrus ovis infestation. Adult flies deposit larvae around the animals' nostrils; the larvae then migrate up the nasal passages into the turbinates and sinuses. With time and multiplication of the larvae, hypersensitivity develops with the marked clinical signs of nasal discharge and face rubbing and shaking. Secondary bacterial infection can occur. The discharge usually contains numerous eosinophils and mast cells, which confirms the diagnosis in this case. Further confirmation could be achieved with radiographs showing mineralized bots or with endoscopy, but this is not usually necessary. Enzootic nasal tumor could have similar clinical signs but tends to cause more dyspnea and would not have the eosinophils and mast cells seen in the discharge. Fusobacterium causes necrotic laryngitis in sheep when there is perforation to the mucous membranes. Clinical signs are more of coughing and dyspnea; there would not be nasal discharge. Actinomyces pyogenes infection is also unlikely to cause nasal discharge and if it did, you would not observe eosinophils and mast cells in the discharge. Treatment of Oestrus ovis is with ivermectin.

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Question

Which of the following is not an inverting suture pattern?

- Cushing pattern
- Connell pattern
- Lembert pattern
- Horizontal mattress pattern

Explanation - The correct answer is horizontal mattress pattern. Both the horizontal and vertical mattress patterns are everting patterns. The others are inverting patterns.

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Question

Which of these drugs could you try to use to treat organophosphate toxicity in sheep?

- 3-Methyl indole
- Atropine
- 4-Methylpyrazole
- Bethanecol

Explanation - The correct answer is atropine. Organophosphates act by inhibition of acetylcholinesterase, causing muscarinic signs such as hypersalivation, incoordination, and bloat. Acute cases can be treated with high doses of atropine or pralidoxime (2-PAM). 4-Methylpyrazole is a treatment for ethylene glycol toxicity. 3-methyl indole is a pneumotoxin produced by rumen microflora when cattle ingest large amounts of L-tryptophan in forage, resulting in atypical interstitial pneumonia.

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Question

Many young (<9 months) rams in a herd develop swelling and edema around the head and neck. There is a serohemorrhagic exudate and local tissue necrosis. What is the most likely cause?

- Clostridium novyi type A
- Corynebacterium pseudotuberculosis

- Mycobacterium bovis
- Clostridium chauvoei

Explanation - The correct answer is Clostridium novyi. This is a description of bighead, a disease in young rams where the clostridial organism, which is present in soil and feces, enters through wounds received from head butting and causes the signs described. Treatment is generally debridement, disinfection, and penicillin.

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Question

A 1 year old female sheep presents to you with a discrete mass on the ventral neck. In cross section, the mass has an "onion-ring" appearance of concentric layers of fibrous tissue separated by inspissated caseous exudate. An aspirate shows many small gram-positive rods both intracellularly and extracellularly. What is the likely etiology?

- Mycoplasma mycoides
- Mycobacterium paratuberculosis
- Corynebacterium pseudotuberculosis
- Escherichia coli

Explanation - The correct answer is Corynebacterium pseudotuberculosis. This is a classic description of how caseous lymphadenitis presents in sheep. Infection may occur via penetration through superficial skin wounds and sometimes through unbroken skin. The pus contains large numbers of bacteria that can survive for months in the environment and be a source of infection. Typical clinical signs are a slowly growing, non-painful mass at the point of entry or a local lymph node. Treatment is usually not attempted as this tends to be a chronic recurring disease causing economic loss. Carriers can be a source of infection to other animals.

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Question

Several young sheep (3-4 months old) in a flock are showing signs of depression, head pressing, opisthotonos, diarrhea and blindness. As you investigate this problem, you realize that the farmer has been mistakenly feeding them horse feed. What disease do the sheep most likely have?

- Listeriosis
- Polioencephalomalacia
- Brain abscesses
- Hepatic encephalopathy

Explanation - The correct answer is polioencephalomalacia (thiamine deficiency). This most commonly occurs in lambs being fed diets that are high in concentrates or molasses such as horse feed. This occurs because in normal lambs, ruminal bacteria produce sufficient thiamine to meet their requirements. Excess feeding of concentrates leads to ruminal acidosis, decreases the population of thiamine-producing bacteria, and increases production and activity of ruminal thiaminase. Other causes of polioencephalomalacia are bracken fern ingestion due to thiaminase in the plant, overdose of amprolium which is a thiamine analog, and high dietary sulfate.

Clinical signs include cortical blindness, head pressing, and incoordination progressing to recumbency, opisthotonos and convulsions. Treatment is with thiamine replacement. Diagnosis is usually based on clinical signs and necropsy findings, but blood thiamine levels and erythrocyte transketolase activity can be measured. Classic necropsy lesions are a soft, edematous cerebral cortex with gray-yellow discoloration and flattened gyri.

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Question

Ulcerative posthitis (pizzle rot) in male sheep is usually associated with finding which of the following?

- Corynebacterium pseudotuberculosis in ulcers on the sheath
- Corynebacterium renale in ulcers on the sheath
- Calcium-magnesium-phosphate stones in the urethral process
- Urethral rupture
- Urine leakage into the ventral abdominal tissues and sheath

Explanation - Also called enzootic balanoposthitis or sheath rot, this condition is associated with feeds high in protein and urine with a high urea concentration which favors growth of Corynebacterium renale.

Corynebacterium renale is a gram-positive bacterium capable of hydrolyzing urea. High protein diets lead to urinary urea concentration increases. Hydrolysis of urea by the bacteria results in production of ammonia, which irritates the penis, prepuce, and skin surrounding the preputial orifice.

The vulva of flock mates may also be affected.

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Question

A multivalent clostridial toxoid vaccine would be likely to reduce the incidence of all of these diseases except for _____.

- Malignant edema
- Redwater disease (Bacillary hemoglobinuria)
- Caseous lymphadenitis
- Black disease
- Blackleg

Explanation - The answer is caseous lymphadenitis. All the other diseases listed are caused by clostridia. Caseous lymphadenitis is caused by Corynebacterium pseudotuberculosis.

Clostridial Diseases – Anaerobic, spore-forming, exo- or enterotoxin forming.

- Bacillary Hemoglobinuria – *C. haemolyticum*. Cattle, red water disease. Sudden death, Hgburia.
- Blackleg – *C. chauvoei* (also *septicum*, *novyi*, *sordelli*). Cattle, sheep. Swelling, hemorrhage, and emphysema in heavy muscles. Rancid butter odor.
- Botulism – *C. botulinum*. Rapidly fatal motor paralysis by ingestion of carrion and subsequent neuro-intoxication (not infection). Neuromuscular weakness progessing to paralysis.
- Hemorrhagic Enteritis and Enterotoxemia - *C. perfringens*
- Infectious Necrotic Hepatitis – Black disease. *C. novyi* + liver flukes. Usually in sudden death in sheep.
- Malignant Edema – *C. septicum* usually, also *chauvoei*, *perfringens*, *sordelli*, *novyi*. Farm animals.
- Tetanus - *C. tetani*. Neurotoxin in necrotic tissue. All mammals (dogs, cats, birds seem resistant). Stiffness, spasms, progressive. Immunization.

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Question

A farmer complains to you that many of his sheep have been doing poorly. You visit his flock and find many listless, emaciated adult sheep that are dyspneic and tachypneic. The sheep have normal temperatures, appetites, and no adventitious lung sounds. What is your top differential?

- Oestrus ovis infestation
- Ovine Progressive Pneumonia
- Chlamydia psittaci pneumonia
- Pasteurella pneumonia

Explanation - Ovine Progressive Pneumonia is caused by a lentivirus, also known as Maedi-Visna virus. This generally causes a chronic, progressive condition, and affected sheep tend to be afebrile and maintain their appetites as long as they do not develop secondary bacterial pneumonia. This is in contrast to Pasteurella pneumonia, which tends to be much more acute. Clinical signs of Oestrus ovis tend to be more confined to the nares. Chlamydial pneumonia is rare in sheep.

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Question

Ingestion of bracken fern (Pteridium aquilinum) causes which of these signs in sheep?

- Polyarthritis
- Hematuria
- Atypical pneumonia
- Hemolytic anemia
- Colitis

Explanation - The correct answer is hematuria. Enzootic hematuria in sheep and goats is caused by ingestion of bracken fern. It causes a hemorrhagic cystitis that progresses to neoplastic changes of the cells within the bladder. It can be severe enough to cause anemia, exercise intolerance, loss of body condition, tachypnea, tachycardia, and pallor.

Brackenfern - Contains thiaminase. Causes thiamine deficiency in nonruminants, esp horses. Polioencephalomalacia in sheep dt impaired thiamine metabolism. Aplastic anemia in cattle.

- Clinical findings - Thiamine deficiency in horses - anorexia, incoordination, crouching stance. Cattle - acute hemorrhagic syndrome, clots in urine, hematuria, pink milk. Chronic enzootic hematuria in sheep and goats.
- Diagnosis - Blood thiamine levels.
- Treatment - Thiamine supplementation. Whole blood transfusion. N-betyl alcohol.

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Question

Viruses with this characteristic are significantly more resistant to environmental degradation; in other words, they survive longer in the environment.

- DNA viruses
- Non-enveloped viruses
- Enveloped viruses
- RNA viruses

Explanation - The correct answer is non-enveloped viruses. Non-enveloped viruses are typically very resistant to environmental degradation and therefore survive longer in the environment and are harder to disinfect than enveloped viruses. For example, parvoviruses are non-enveloped viruses and are difficult to disinfect and survive in the environment longer compared to influenza viruses which are enveloped. Whether a virus is a DNA or RNA virus has no effect on its environmental durability.

.....

Question

While performing a physical exam on a ewe, you see a small ectoparasite. You are unsure if this is a sheep ked or a tick. What is an easy way to find out?

- Only ticks feed on blood
- Count the legs
- Sheep keds have wings
- Sheep keds do not cause pruritus

Explanation - The correct answer is count the legs. Ticks are arachnids with eight legs and sheep keds (Melophagus ovinus) have six legs. Sheep keds are wingless flies. The adults feed on blood. Clinical signs include pruritus, stained wool, and potentially anemia.

FIGURE 17.5 Sheep ked, *Melophagus ovinus* (Hippoboscidae), female, dorsal view. (Courtesy of Cornell University Agricultural Experiment Station.)

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Question

The image shows a one-month old lamb from an unvaccinated commercial flock which is unable to stand and shows muscle spasms and rigidity when stimulated. The lamb was tail docked and castrated at 3 days of age using elastrator bands on the tail and scrotum. What is the most likely diagnosis?

- Cerebellar hypoplasia
- Spina bifida
- Selenium deficiency and white muscle disease
- Spastic syndrome
- Tetanus

Explanation - Since the lamb was from an unvaccinated ewe and was neither given tetanus antitoxin nor vaccinated against tetanus, the compatible clinical signs make tetanus the most likely correct diagnosis.

.....

Question

In the middle of a surgery the primary surgeon on the case requests a pack of non-absorbable suture. Which will you give the surgeon?

- Catgut
- Maxon
- Prolene
- Dexon
- Polydioxanone (PDS)

Explanation - The correct answer is prolene. Prolene is a monofilament non-absorbable suture which retains great tensile strength. This type of suture along with nylon suture is usually used on skin. PDS is a monofilament suture which is degraded by hydrolysis. Absorption is complete in approximately 182 days, and it retains tensile strength for 28-56 days. Dexon is a braided, multifilament, absorbable suture which is absorbed by hydrolysis in 100-120 days. Tensile strength is lost in 7-14 days. Catgut is broken down by phagocytosis and retains tensile strength for 14-28 days. Maxon is absorbed by hydrolysis starting at day 60 and completely absorbed by 6 months. Tensile strength is retained for about 21 days.

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Question

You are called by a sheep rancher in the western USA who has lost 60 mature sheep in the last 2 days. He describes the signs he has observed: they act depressed, the few he has caught had a fever of between 104 and 106F, they have respiratory distress and congested mucous membranes, and many developed convulsions shortly before death occurred. Some had bloody discharges coming from the nose and rectum after death. He cut open one animal and the spleen was large and looked like blackberry jam. There were hemorrhages on many of the organs. You tell him not to cut any more open and to bury the others. What do you do next?

- Notify state
- Perform fresh necropsy and submit the liver for a heavy metal panel
- Move the herd to a different pasture immediately
- Begin treatment with Naxcel on surviving herd
- Perform fresh necropsy and submit spleen for histopathology

Explanation - These signs are classic for anthrax. The diagnosis should be confirmed by examining a blood sample for Bacillus anthracis. Humans should use care to avoid exposure of this potentially zoonotic infection. The disease is reportable, and you must notify state officials immediately.

.....

Question

Calcium homeostasis is extremely important in lactating animals and is controlled by two hormones, parathyroid hormone (PTH) and what other hormone?

- Dopamine
- Thyroxine
- Adrenocorticotropin
- Calcitonin
- Somatotropin

Explanation - Calcitonin is produced by the C cells of the thyroid gland in response to high calcium levels in blood. Calcitonin increases renal calcium excretion and decreases osteoclastic activity (bone resorption). PTH does the opposite and also stimulates renal production of 1,25-dihydroxycholecalciferol. This form of vitamin D stimulates intestinal cells to increase Ca absorption.

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Question

The synthesis of which of these clotting factors is dependent on vitamin K?

- Factor V
- Factor VIII
- Factor IX
- Factor VI
- Factor III

Explanation - The correct answer is factor IX. The vitamin K dependant factors are II, VII, IX, and X. This is important when animals are exposed to a vitamin K antagonist, such as many rodenticides.

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Question

In autumn, a 3-year old Texel ram presents with swelling and edema of the face (see image). There is no hemorrhage or apparent gas pockets. The ram is dull and depressed with a rectal temperature of 106 F. The mucous membranes are congested and submandibular lymph nodes cannot be palpated due to edema. This is the only ram clinically affected. What treatment or management recommendation is most appropriate?

- Cull the affected ram and treat the other sheep in the herd with penicillin
- Treat affected ram with sodium iodide
- Treat all sheep in herd with oxytetracycline
- Eliminate scabrous feeds
- Treat the affected ram with penicillin

Explanation - The most likely condition to consider based on the image and presentation is bighead (caused by Clostridium novyi, C. sordellii, or rarely C. chauvoei). Bluetongue is less likely based on one sheep being affected. Treatment with penicillin is usually effective.

Culling or treating all animals is unnecessary as Clostridium is found in the soil and feces of healthy animals. Bighead is caused when the organism enters through wounds obtained during head butting activities. The disease can be fatal if untreated. The key to reducing the incidence of this disease is management to reduce head wounds and vaccination with multivalent clostridial toxoids.

.....

Question

Which of the following signs is strictly associated with central vestibular disease?

- Head tilt toward the side of the lesion
- Non-positional horizontal nystagmus
- Positional, vertical nystagmus
- Circling toward the side of the lesion

Explanation - The correct answer is positional, vertical nystagmus. Positional and vertical nystagmus only occur with central vestibular disease. Circling, head tilt, and horizontal nystagmus all occur with either central or peripheral vestibular disease.

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Question

How many milliliters of 50% dextrose should you use to make 1 liter of 5% dextrose

- 55
- 100
- 50
- 70
- 10
- 5

Explanation - 50% dextrose contains 500 mg/ml of dextrose. The final goal of 5% dextrose solution will have 50 mg/ml of dextrose. We want 1 liter (1000 ml) total, so using stoichiometry, you can set up the problem like this:

50mg/ml x 1000ml= 50,000mg total desired in 1 liter of fluid.

50,000mg/(500mg/ml) = 100ml of 50% dextrose.

In the actual clinical setting, you can remove 100ml of fluid from a 1 L bag, and replace it with the 100ml of 50% dextrose to make 1 liter of 5% dextrose.

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Question

Which of the following suture patterns used for closing hollow viscera purposefully enters the lumen?

- Ford interlocking pattern
- Cushing pattern
- Horizontal mattress pattern
- Connell pattern

Explanation - The correct answer is Connell pattern. Both the Connell and Cushing patterns are used to close hollow viscera because they are very effective at inverting tissue and creating a watertight seal. The difference between these two patterns is that Cushing pattern only goes through the submucosa and does not enter the lumen. The Ford interlocking and horizontal mattress patterns are not used for closing hollow viscera.

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Question

What toxin can cause the congenital abnormalities of cyclopia, anophthalmos, cleft palate, and metacarpal hypoplasia if ingested by a pregnant ewe?

- Astragalus
- Fescue
- Oxytropis

- Veratrum californicum

Explanation - The correct answer is Veratrum californicum. Also known as **false hellebore** or **corn lily**, it contains a teratogen called **cyclopamine** that can cause these birth defects in fetal lambs. Another plant, **Veratrum viridae** is called **skunk cabbage** and can cause the same lesions. Astragalus and oxytropis are also known as locoweeds and can cause abortions, weak lambs, or bent legs but not the abnormalities listed in this question. Fescue can influence reproductive efficiency but does not cause these congenital defects.

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Question

Which of the following animals has oval erythrocytes that do NOT have nuclei?

- Frogs
- Llama
- Elephants
- Mouse
- Chicken

Explanation - Camelids have ovoid anucleated erythrocytes. Mice and elephants have round erythrocytes. Frogs and chickens have nucleated erythrocytes.

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Question

Which of the following is accurate concerning maintenance of pregnancy in domestic mammals?

- In sheep, the placenta takes over progesterone production early in gestation, i.e. by 50 days
- In horses, the ovarian source of progesterone peaks relatively early in gestation and is gradually replaced by placental sources of progesterone
- In pigs, the pregnancy is dependent upon ovarian sources of progesterone throughout gestation
- In cows, the latter half of pregnancy is maintained by ovarian and placental progesterone
- None of the choices listed are accurate
- All choices listed are accurate

Explanation - All choices listed are accurate. Progesterone is essential for maintenance of pregnancy in all domestic mammals. Some species (sheep, horse, cow) get progesterone support from the ovarian corpus luteum initially; that progesterone production is later augmented (cow) or replaced entirely by placental sources (sheep, horse). The pig, however, is dependent on ovarian progesterone throughout her 113-114 day gestation.

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Question

Q fever can be acquired by humans from sheep. In humans it can cause fever, headache, fatigue, premature delivery, or abortion. What organism causes Q fever?

- Erysipelothrix rhusiopathiae
- Hendra virus
- Coxiella burnetii
- Bordetella bronchiseptica

Explanation - C. burnetii is a small gram negative spore-forming intracellular bacterium.

Q-Fever - *Coxiella burnetti*, rickettsial infection. Usu inapparent. Can cause abortion in sheep, goats, cattle. Causes influenza-like diz in man; endocarditis.

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Question

A flock of sheep is struggling with an outbreak of Dermatophilus congolensis in the lambs. What is your recommendation to the owner?

- Isolate and euthanize affected individuals
- Remove sheep from the rain
- Shear all affected sheep
- Treat herd with ivermectin

Explanation - The correct answer is remove sheep from the rain. D. congolensis is an actinomycete that primarily affects the dorsal surface of animals. Clinically, crusty lesions will form which are easy to pull off, and many people describe them as a paintbrush lesion. In sheep, this disease may be known as **strawberry footrot** when the claws are affected. Valuable individuals may benefit from dry conditions plus antimicrobial therapy. The main predisposing factor to infection is being in prolonged wet conditions such as frequent rain. Ivermectin is a poor answer choice because the organism is a gram positive branching actinomycete. Chronically infected sheep may be a source of infection, but euthanizing all affected is not necessary or practical if they are kept in dry conditions.

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Question

Botulism can be a foodborne intoxication in humans, particularly young infants. Which of the following is a common food source of Clostridium botulinum?

- Honey
- Unpasteurized milk
- Unpasteurized apple juice
- Cereals
- Pork containing meats

Explanation - Honey is a known source of clostridial spores. When ingested by infants, they produce the neurotoxin that can cause infant botulism. For this reason, many physicians recommend that infants under 12 months of age should not be fed honey.

Signs and symptoms of infant botulism include:

Persistent constipation
Floppy arms, legs and neck
Weak cry due to muscle weakness
Weak sucking and poor feeding
Lethargy
Difficulty breathing

Botulism spores may also be found in low-acid home-canned foods and corn syrup.

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Question

What developmental defect is seen in lambs born from ewes infected with bluetongue virus during pregnancy?

- Hydrocephalus
- Cyclopia
- Hydranencephaly
- Cerebellar hypoplasia

Explanation - The correct answer is hydranencephaly. This abnormality is a condition in which the brain`s cerebral hemispheres are like swiss cheese or absent and replaced by sacs filled with cerebrospinal fluid. Ewes infected with bluetongue virus while pregnant can have lambs with this defect.

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Question

The image shows a 4 month old Suffolk lamb with severe carpus valgus. What is the name commonly given to this hereditary condition in Suffolks?

- Carpus varus
- Inherited hypocalcemia and rickets
- Spider lamb syndrome
- Suffolk polyneuritis
- Inherited spasticity

Explanation - Spider lamb syndrome. The condition is a severe chondrodysplasia of Suffolk and Suffolk cross sheep, caused by an autosomal recessive trait. It is also called **Ovine Hereditary Chondrodysplasia**.

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Question

In a flock of sheep, numerous animals develop crusting lesions around the coronary bands during a moist winter. As you remove the crusts, there is pink granulation tissue underlying the crusts. You perform cytology on one of the crusts and see branching "railroad tracks" of cocci bacteria. What are these bacteria?

- Dermatophilus congolensis
- Dichelobacter nodosus
- Staphylococcus intermedius
- Clostridium novyi
- Staphylococcus aureus

Explanation - The disease described is commonly termed strawberry footrot. Dermatophilus can also cause rain scald, a similar crusting condition associated with moisture, and affecting the ears, muzzle, face, tail and sometimes the dorsum. It tends to affect younger animals more severely. The granulation tissue under the crusts gives the "strawberry" appearance, and the cocci in "railroad tracks" are the other key to the diagnosis.

Staphylococcal dermatitis in sheep is usually due to S. aureus and is usually associated with a puncture or other injury to the skin, allowing invasion. Clostridium novyi in sheep and goats causes malignant edema or "bighead" which is a disease where clostridial spores enter through fighting wounds and cause head and neck edema. Dichelobacter nodosus is a cause of infectious footrot, which infects the claws of the feet.

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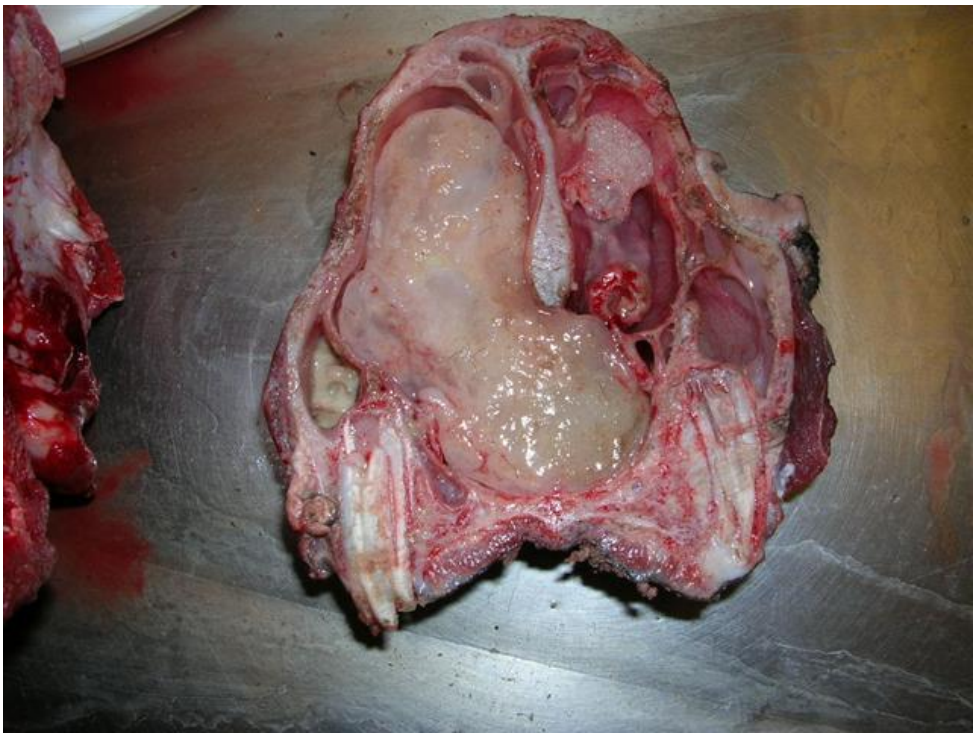
Question

You are asked to euthanize and perform a post mortem on a yearling sheep that the owner says had developed progressive exercise intolerance, rapid and noisy breathing, nasal discharge and nasal distortion. It has recently started open mouth breathing. On post mortem you find the soft nasal lesion shown in the image. What is your diagnosis?



- Nasal abscess
- Oestrus ovis infestation
- Allergic rhinitis
- Nasal adenocarcinoma
- Osteosarcoma

Explanation - The cause of this tumor of sheep and goats is the **ovine nasal adenocarcinoma virus** (ONAV) or **caprine nasal adenocarcinoma virus** (CNAV). The tumor is not metastatic but locally expansive and destructive as seen in the photo.

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Question

A sheep presents in a sitting position with apparently normal forelimbs and hyperreflexia of the hind limbs. Where would you localize the lesion to?

- Brainstem
- Cerebrum
- T3-L3 myelopathy
- L4-S3 myelopathy
- C6-T2 myelopathy

Explanation - The correct answer is T3-L3 myelopathy. With a T3-L3 myelopathy, thoracic limbs would be normal because the nerve roots to the limbs emerge from the spinal cord cranial to the injury. Hyperreflexia to the pelvic limbs is an upper motor neuron sign indicating a lesion cranial to L4. A C6-T2 myelopathy would cause lower motor neuron signs to the thoracic limbs. Cerebral and brainstem lesions would be unlikely to cause this type of lesion distribution.

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Question

It is September and many adult sheep in a California flock appear acutely ill. Two have just died, and the owner has brought them to your clinic for a post mortem exam. Both have swollen edematous ears and muzzle. You perform a post mortem on these two and note white streaks in the skeletal muscles, ecchymotic hemorrhages in the lymph nodes and spleen, and subendothelial hemorrhage at the base of the pulmonary artery.
Based on these findings you tentatively diagnose what condition?

- Sheep pox
- Malignant catarrhal fever
- Contagious ecthyma
- Bluetongue
- Foot-and-mouth disease

Explanation - Bluetongue causes widespread **multisystemic vasculitis**. There may be lameness associated with Zenkers degeneration of skeletal muscles (those white streaks). Other signs also include edema of the ears and face, loss of oral mucosa, and hemorrhages in lymph nodes and the spleen.

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Question

Which of the following toxic plants results in acute death?

- Ragwort
- Milkweed
- Moldy sweet clover
- Bracken fern

Explanation - The correct answer is milkweed. Milkweed is a cardiac glycoside which can cause acute clinical signs and death. Bracken fern toxicity causes bone marrow depression in ruminants and can take up to 3 months to show clinical signs. Moldy sweet clover leads to coagulopathy via vitamin K antagonism after consumption over long periods of time. Ragwort is a pyrrolizidine alkaloid which causes liver disease after several months of consumption.

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Question

Which of these findings is LEAST consistent with a diagnosis of pregnancy toxemia in a ewe?

- Glucosuria
- Azotemia
- Ketonuria
- Neurologic signs (circling, stargazing)
- Hypocalcemia

Explanation - The answer is glucosuria. Pregnancy toxemia typically occurs in late gestation, usually in females carrying multiple fetuses, due to the ewe's inability to consume sufficient energy to support the pregnancy. The ewe's enlarging uterus often causes decreased rumen volume and subsequently, decreased dry matter intake. Negative energy balance results in the need for glucose production from the liver to occur because there is not enough glucose absorbed through the GI tract. The liver utilizes fatty acids and glycerol, but when demands are great, the liver cannot produce enough glucose and becomes overwhelmed with free fatty acids, resulting in the production of ketones. Pregnancy toxemia is characterized by depression, CNS signs such as tremors, stargazing, circling, and teeth grinding, low glucose concentrations, high ketones in the blood (elevated free fatty acids, and beta-hydroxybutyrate), decreased serum calcium and potassium, and increased BUN. Necropsy findings will include a pale, swollen liver. Treatment of pregnancy toxemia includes administration of dextrose, B vitamins, calcium, propylene glycol, transfaunation, and Cesarean section in critical cases. Prevention by feeding concentrates is much more effective than treatment.

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Question

What causes the Whitten effect (buck effect)?

- Removal of an old male
- Introduction of a new female
- Removal of an old female
- Introduction of a new male

Explanation - The correct answer is introduction of a new male. This induces sheep and goats to ovulate at the same time.

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Question

Ionized serum calcium levels are influenced by three regulatory hormones. Of the following, which are the correct three?

- Parathyroid hormone (PTH), calcitonin, and 1,25-dihydoxycholecalciferol D3
- Vitamin D3, somatotropin and parathyroid hormone (PTH)
- Parathyroid hormone (PTH), Vitamin D3, and calcitriol
- Thyroxine, calcitonin, and parathyroid hormone (PTH)

Explanation - PTH comes from parathyroid chief cells in response to hypocalcemia. Calcitonin is from thyroid parafollicular glands in response to hypercalcemia. 1,25-dihydroxycholecalciferol D3 is of renal origin and sometimes called calcitriol.

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Question

On gross post mortem exam of 2 sheep that died and were typical of some ill sheep in a western USA flock, you note white streaks in the skeletal muscles and endothelial hemorrhage at the base of the pulmonary artery, as well as ecchymotic hemorrhages in the lymph nodes and spleen. What is the most likely diagnosis?

- Sheep pox
- Bluetongue
- Foot-and-mouth disease
- Malignant catarrhal fever

Explanation - The underlying lesion of bluetongue is a vasculitis, and the lesions are multisystemic.

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Question

Many young (<9 months) rams in a herd develop swelling and edema around the head and neck. You diagnose bighead (Clostridium novyi Type A). What is the treatment?

- No treatment is necessary, the disease is self-limiting
- Cull or isolate affected animals
- Vaccinate the affected animals against Cl novyi
- Wound debridement and penicillin

Explanation - The correct answer is debridement and penicillin. Culling is unnecessary as Clostridium novyi is found in the soil and feces of healthy animals. Bighead is caused when it enters through wounds obtained during head butting activities. The disease can be fatal if untreated. The key to reducing the incidence of this disease is management to reduce head wounds and vaccination with multivalent clostridial toxoids.

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Question

Several lambs in a hobby flock are reported to be acting sick and not eating. On examination of the affected lambs, you note low grade fevers and lesions around the gums, and in some cases, the proliferative lesions seen in the photo. Several ewes also have similar lesions on their teats. Your diagnosis is _____.

- Bluetongue
- Contagious ecthyma
- Foot and Mouth disease
- Pseudocowpox
- Bovine papular stomatitis

Explanation - Also known as orf and soremouth, CE is mainly a disease of sheep and goats. It also affects humans, as do the other two parapox viruses, bovine papular stomatitis and pseudocowpox, which are found in cattle. CE is rarely fatal but causes lesions in mouths of lambs/kids and sometimes on the teats of the mothers, making nursing a problem. The virus remains in the scabs that fall off.

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Question

What is the cause of grass tetany in sheep?

- Mycotoxins
- Magnesium toxicity
- Calcium deficiency
- Copper deficiency
- Magnesium deficiency

Explanation - The correct answer is magnesium deficiency. Magnesium is important for nervous system function and many enzymatic reactions. The skeletal reserves of magnesium are much smaller than the calcium reserve. Magnesium deficiency leads to grass tetany. Magnesium toxicity is rare. Grass tetany usually occurs in the early spring on pastures that are well fertilized with nitrogen and potassium because high levels of these inhibit magnesium absorption from the GI tract. Copper deficiency causes enzootic ataxia. If you chose mycotoxins, you may have been thinking of grass staggers, which is a different disease.

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Question

A 3-day-old Suffolk male lamb presents in sternal recumbency with increasing abdominal distension and mild colic (see image). The lamb was bright and alert for the first 2 days of life but has since stopped suckling its dam. Clinical examination reveals that the lamb has no anus. What should you recommend?

- Medical management with antibiotics and analgesics are necessary until the problem resolves
- Surgical correction is frequently successful
- This is normal in lambs and will resolve within 1-2 weeks
- There is no effective treatment and the lamb should be euthanized

Explanation - Atresia of the colon, rectum and anus can all occur congenitally. Often, the clinical sign first noted is progressive abdominal distension. In this case, atresia ani was detected on clinical exam but atresia of the colon or rectum may require radiography to diagnose. Surgical establishment of anal patency can be performed for atresia ani whereas a permanent colostomy may be required for atresia of the colon and rectum.

If surgical correction is attempted, the animal should probably be neutered because of the potential genetic basis for this condition. To perform the surgical correction, a slight bulge in the skin may be present where the anus should be located in lambs or ultrasound can be used to detect the fluid filled rectum. After surgical preparation and local anesthetic injection, an incision to remove the skin over the rectum should be made. Post-surgically, antibiotics and either mineral oil, DSS, or stool softeners should be given as needed. If possible, twice daily insertion of a thermometer to prevent stricture is preferred.

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Question

What are the most common etiological agents of contagious footrot in sheep?

- Dermatophilus congolensis and Fusobacterium necrophorum
- Dichelobacter nodosus and Fusobacterium necrophorum
- Prevotella melaninogenicus and Fusobacterium necrophorum
- Arcanobacterium pyogenes and Dichelobacter nodosus

Explanation - Dichelobacter nodosus and Fusobacterium necrophorum

Remember, these pathogens are highly contagious in sheep. As with cattle, the lesion will be in the interdigital space. Arcanobacterium pyogenes may cause footrot in cattle. Prevotella melaninogenicus is one of the main causes of footrot in cattle, along with F necrophorum. Dermatophilus congolensis is responsible for strawberry footrot in sheep. 10% zinc sulfate foot baths can be used to treat.

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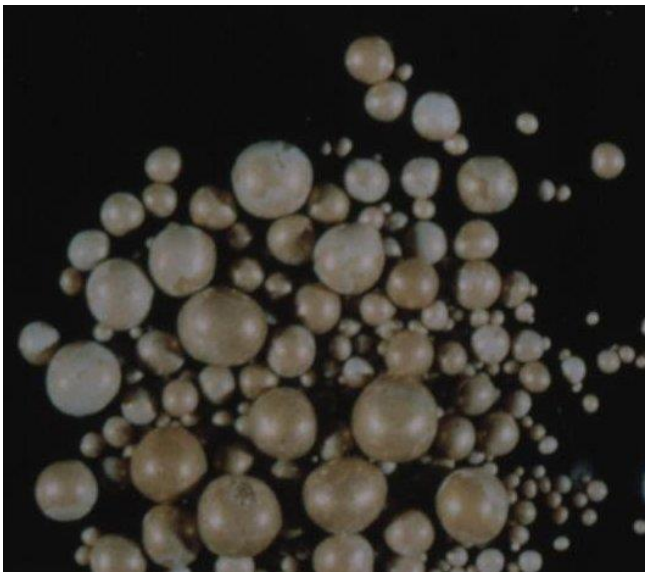
Question

Which type of urolith (shown in the image below) occurs most commonly in sheep grazing lush clover pastures?



- Calcium oxalate
- Silicate
- Struvite
- Calcium carbonate

Explanation – The correct answer is calcium carbonate. The clover or alfalfa pasture contains high levels of calcium and often high levels of oxalates. In the gut, oxalate avidly binds calcium and makes it unavailable for absorption. With gradual introduction of oxalate-rich diets, ruminal bacteria efficiently metabolize oxalate to bicarbonate. Thus, microbial metabolism of oxalate in the rumen may increase the availability of dietary calcium. These factors may combine to increase urinary calcium excretion and alkalinize the urine, thereby promoting calcium carbonate calculogenesis.

Silicate stones are the result of high intakes of silica in mature range grasses, combined with other factors such as dehydration. Struvites (magnesium ammonium phosphate) tend to be found in feedlot animals receiving large amounts of grain which contains high levels of phosphorus.

Calcium oxalate crystals are often present in ruminant urine and may be incorporated in small amounts into other types of stones.

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Question

You are presented with a valuable male Suffolk sheep (ram) that is one year of age. It was straining to urinate yesterday and today appears anorectic, depressed and weak. The TPR is normal, but there is no rumen motility. The breath has an ammonia-like smell. An electrolyte panel reveals hyponatremia, hypochloremia, and hyperphosphatemia. Which of the following disorders is the correct diagnosis?

- Copper toxicity
- Ruptured bladder
- Salt poisoning
- Water intoxication
- Nephrolithiasis and obstructed ureter

Explanation - The electrolyte abnormalities, in addition to the signalment and history of straining, are classic for uroabdomen. The sheep would likely also have hemoconcentration and increased creatinine. In cases of ruptured bladder, some urine may still be passed if the urethra is not completely blocked. Ultrasound would detect free abdominal fluid. Urea may not be elevated because it is recycled into the rumen via saliva and utilized by rumen bacteria.

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Question

A farmer comes to you because many of his sheep are dying. After you examine several of his sheep, you find that many are tachypneic, icteric (see image), depressed and have hemoglobinuria. You suspect that there may have been a feed mixing error. What mineral excess is most likely responsible for these signs?

- Iron
- Sulfur
- Copper
- Calcium

Explanation - The correct answer is copper. Sheep are highly susceptible to copper toxicity. Because this causes an **acute hemolytic crisis**, the most common signs are acute death, icterus, depression, hemoglobinuria, increased respiratory rate, and weakness. Pathology often shows dark, hemoglobin filled kidneys ("gun metal blue"). **Goats and cattle are less susceptible to copper toxicity**.

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Question

Which correctly describes the innervation of the iris sphincter muscle in mammals?

- Innervated by sympathetic nervous system by cranial nerve III
- Innervated by parasympathetic nervous system by cranial nerve V
- Innervated by sympathetic nervous system by cranial nerve V
- Innervated by parasympathetic nervous system by cranial nerve III

Explanation - The correct answer is that it is innervated by parasympathetic nervous system by cranial nerve III. The iris sphincter is stronger than the iris dilator. It receives parasympathetic innervation by cranial nerve III. It is comprised of smooth muscle in mammals, unlike birds, where it is striated. The innervation makes sense if you consider that when your sympathetic nervous system is activated, your eyes become dilated; that leaves the parasympathetic nervous system to constrict the pupil, which is the responsibility of the sphincter.

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Question

After severe weather conditions of driving wind and snow, a shepherd complains that a large number of heavily pregnant ewes on the hill have suddenly become blind. The ewes are markedly photophobic with blepharospasm and epiphora with tear staining of the cheeks. Clinical examination reveals pronounced conjunctivitis and keratitis (see image). In some eyes there is also corneal ulceration more clearly observed after fluorescein dye strips have been placed in contact with the eye. Which of the following is the most appropriate recommendation?

- Systemic atropine
- Cull affected animals
- Topical or systemic antifungal (i.e. natamycin)
- Topical or systemic antibiotic (i.e. oxytetracycline)

Explanation - This case describes sheep with classic signs of infectious keratoconjunctivitis (IKC). The two common causal organisms of IKC in sheep are **Mycoplasma** and **Chlamydia**. Each are susceptible to wide range of antibiotics including oxytetracycline. Topical oxytetracycline ophthalmic ointment or powder can be applied twice daily. Ewes with bilateral corneal lesions should be injected with long-acting oxytetracycline. Ewes with impaired vision in both eyes must be housed, thereby ensuring adequate feeding. Confinement also prevents deaths from misadventure. Ewes should be taken off exposed hill ground when storms are forecast but this is not always possible.

Topical 1% atropine may be beneficial in severe cases with painful ciliary body spasms but systemic atropine is not recommended.

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Question

You are asked by the owner of a large sheep flock to solve his problem, which is that many of his sheep are developing caseous lymphadenitis caused by Corynebacterium pseudotuberculosis. What is the best LONG TERM solution for his flock problem?

- After shearing, cull all animals with visible boils
- Use oral sodium iodide on the flock to rid all sheep of C. pseudotuberculosis
- Treat all sheep with long-acting penicillin
- Treat the entire flock with long-acting IM tetracycline
- Vaccinate all sheep against C pseudotuberculosis

Explanation - Vaccinate all sheep against C pseudotuberculosis. The commercial vaccine can effectively reduce the prevalence of caseous lymphadenitis when employed as recommended by the manufacturer. Other steps such as cleaning clippers at shearing when a boil is hit, and culling animals with boils before shearing, may also be helpful.

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Question

After introducing a group of new sheep to his flock, a farmer calls you out because many of his sheep have developed severe lameness. You examine the animals and find a malodorous exudate and partial separation of the horn of the hoof from the skin. You stain the exudate and find gram negative barbell shaped rods. What is the agent responsible?

- Dichelobacter nodosus
- Dermatophilus congolensis
- Foot-and-mouth disease
- Staphylococcus aureus

Explanation - Dichelobacter nodosus is the cause of infectious footrot in sheep. Lesions are typically as described in this case and often occur after introduction of a new animal or moving to an infected pasture. If you were unable to determine the answer from the description of the lesions, of the answer choices, Dichelobacter is the only gram negative bacteria.

Dichelobacter nodosus, footrot lesion, sheep

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Question

A sheep owner has had several 2-to-3-month old lambs die in the last few weeks. The animals affected are observed to be weak for a day or die suddenly. You perform a postmortem exam on two and note almost identical cardiac lesions consisting of pale areas of muscle necrosis (see image). You diagnose nutritional myodegeneration. What treatment should now be recommended for the remainder of the lambs?

- Long acting Penicillin SQ to all at risk lambs
- Vaccination against Clostridial ssp. causing myonecrosis
- Copper and vitamin A supplementation
- Remove all animals from pasture to avoid further exposure to white snakeroot (Eupatorium rugosum)
- Selenium and Vitamin E supplementation

Explanation - This condition, also known as white muscle disease, can affect lambs, kids, calves and foals. Rapidly growing animals are most affected. The disease has cardiac and skeletal muscle forms. For the immediate needs, injectable vitamin E and selenium should be given to all at-risk animals. Oral selenium and vitamin E supplementation should also commence.

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Question

What is the vector of bluetongue?

- Dermacentor ticks
- Culex mosquitoes
- Oestrus ovis flies
- Melophagus ovinus flies
- Culicoides gnats

Explanation - Culicoides gnats are the main route of transmission of bluetongue virus, although it can also be transmitted sexually or transplacentally. C sonorensis (formerly C variipennis) is the main species responsible for transmission in the USA.

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Question

It is the January cool rainy season in northern California. A flock of ewes has lambed in the last 30 days and are feeding on lush grass pasture. Most ewes have twins. A number of ewes are reluctant to move, are standing with their heads down, and do not appear to be eating much. A few ewes have collapsed on their side developed clonic convulsions and tetany, and then died. Lambs appear unaffected. Which of the following disorders is most likely and must be ruled out?

- Hypomagnesemia
- Selenium deficiency
- Hypophosphatemia
- Molybdenosis (secondary copper deficiency)
- Mycotoxicosis

Explanation - Also known as grass tetany and lactation tetany, hypomagnesemia occurs most commonly in **lactating ewes**, cows, and goats that are lactating heavily and taking in an insufficient daily intake of magnesium. Cool weather also seems to play a role by reducing plant Mg uptake. Ewes are often also hypocalcemic.

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Question

A dairy farmer wants to sell some land 100 yards from his corrals to a neighbor who plans to raise sheep. Why is this a bad idea?

- Sheep make dairy cattle nervous and decrease feed consumption and milk production
- Sheep keds will infect the cattle, causing loss of milk production
- Sheep carry Salmonella dublin which can cause abortion and calf deaths in cattle

- Sheep can transmit malignant catarrhal fever virus to cattle
- Sheep carry bovine viral diarrhea (BVD) virus which they transmit to cows via stable flies

Explanation - Most sheep carry the ovine herpes virus-2, which easily spreads (even by close proximity) to cattle, bison, deer and other similar species where it can cause fatal lymphocytic vasculitis. The disease is called malignant catarrhal fever (MCF).

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Question

A 3-year old llama presents to you with ataxia and hindlimb paresis that began in the hind limbs and progressed to the front limbs over the course of 2 months. Bloodwork is unremarkable, and vertebral radiography is within normal limits. Cerebrospinal fluid analysis shows eosinophilia. What is the most likely diagnosis?

- Bacterial meningitis
- Cervical spondylopathy
- Tick paralysis
- Listeriosis
- Taenia saginata
- Parelaphostrongylus tenuis

Explanation - The meningeal worm (Parelaphostrongylus tenuis), also known as the deer worm or meningeal deer worm, frequently infects llamas and alpacas. The definitive host is the white-tailed deer, but llamas and alpacas are aberrant hosts and typically display neurologic signs that may include hypermetria, ataxia, stiffness, muscle weakness, posterior paresis, paralysis, arching neck, and circling. Clinical signs generally begin in the hind limbs and progress to the front limbs. The course of disease is variable.

The key to answering this question is recognizing the eosinophilia in the CSF fluid which suggests a parasitic infection. Taenia saginata is a beef tapeworm which can infect humans. The other choices are less likely in this case due to the CSF findings.

There may be a few questions on camelids on your board exam. There are a few diseases that are specific to them that are worth knowing a little bit about for your exam including choanal atresia and meningeal worm infections.

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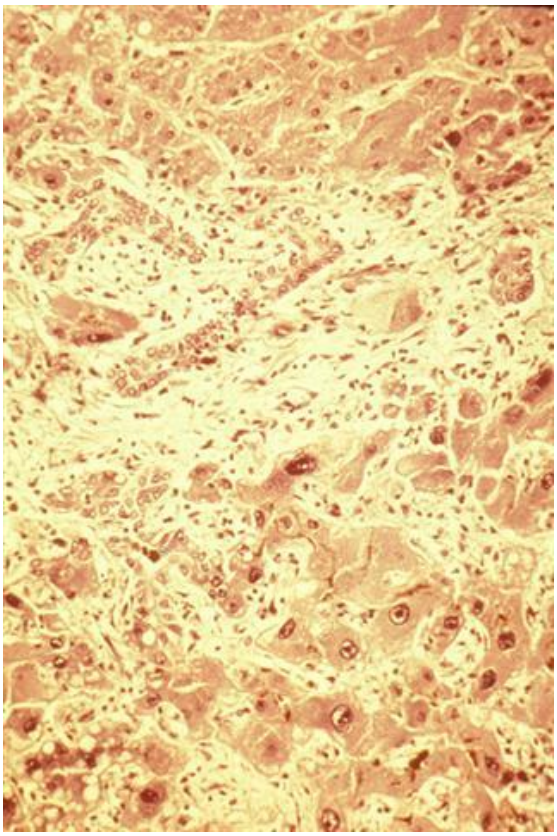
Question

You examine a group of sixty 4- to 7-month old dairy calves which appear small and thin. The owner says that in the last few weeks several have developed diarrhea and quit eating, and two have recently died. You note some sunburned white areas on the skin, all are thin, and several are very weak. You do a postmortem examination on the worst and find a small hard liver. The biopsy looks as shown in the photo with fibrosis, bile duct proliferation, and megalocytosis. What is your diagnosis?



- Black disease
- Gossypol toxicity
- Pyrrolizidine alkaloid toxicosis
- Mycotoxicosis
- Oleander toxicity

Explanation - PZAs inhibit mitosis of hepatocytes, so they cannot multiply. As they age, they become large (megalocytes) and when they die they are replaced by fibrous tissue. Bile ducts proliferate as a nonspecific response to hepatic damage. You then look at some of the older alfalfa bales he was feeding to these calves and find loads of Senecio vulgaris, a PZA containing plant.
Aflatoxins (a mycotoxin) from Aspergillus and other fungi can cause liver lesions that are similar, but most pathologists think that finding megalocytes is diagnostic for PZA toxicity.

Question

An adult 3-year old Suffolk ewe presents to the hospital with an acute onset of depression, icterus, pallor, and cold extremities. The 10 sheep have been housed in a small corral for the last several years, and are regularly vaccinated against common Clostridial diseases (last vaccines given 6 months previously). The owner has been supplementing his sheep's grass hay with grain formulated for his steers. What is the most likely diagnosis?

- Copper toxicity
- Clostridium perfringens type A (yellow lamb disease)
- Liver flukes

- Carbon monoxide poisoning

Explanation - The correct answer is copper toxicity. To determine this, think about the clinical signs and the fact that steer feed contains too much copper to be safely fed to sheep. As a result of eating feed too high in copper (sheep being the most susceptible species) the liver copper levels build up until suddenly released causing massive homolysis and resulting icterus. This is often fatal. Copper toxicity causes hemoglobinemia, hemoglobinuria, and, renal failure. Carbon monoxide toxicity is unlikely in outdoor animals and will not cause all the clinical signs mentioned. Onion poisoning can cause hemolytic anemia, but these sheep are confined and were not known to be exposed to onions. There has been no possible exposure to liver flukes (wet areas with snails). C perfringens types C and D vaccines were given (no type A vaccines are sold in the US), and yellow lamb disease is highly unlikely in a 3-year old sheep.
