

Question

You examine a lame cow (see image) and find a deep sole abscess on the left front (LF) medial claw. What is the most effective treatment?



- Non-steroidal anti inflammatory drugs (NSAIDs) systemically
- Debride abscess and apply wooden hoof block to LF lateral claw
- Apply local anesthesia and heavily bandage the affected claw
- Apply wooden hoof block to LF medial claw
- Systemic penicillin for 5 days

Explanation - Hoof abscesses must be **debrided down to healthy bleeding tissues** and can then either be bandaged or left open. A wooden hoof block is used to elevate the unaffected claw and provide pain relief so the cow can walk. Systemic antibiotics are not necessary if the abscess is confined to the sole, but could be used in a valuable animal to be sure to prevent any escaping bacteria from causing a problem such as valvular endocarditis.

Question

An outbreak of psoroptic mange is identified in a herd of cattle. What is the treatment of choice?

- Albendazole
- Ivermectin
- Levamisole
- Pyrethrin

Explanation - The correct answer is ivermectin. Albendazole and levamisole are used to treat worms. Ivermectin is more effective than pyrethrin.

Psoroptic Mange

This reportable disease, caused by *Psoroptes ovis*, does not spread to humans. It is seen in range and feedlot beef cattle from the central and western states of the USA. Intense pruritus usually begins on the shoulders and rump; papules, crusts, excoriation, and lichenification are seen. Lesions may cover almost the entire body; secondary bacterial infections are common in severe cases. Death in untreated calves, weight loss, decreased milk production, and increased susceptibility to other diseases can occur.



Question

You are called to examine and treat a valuable 3 year old show cow that appeared normal yesterday but has collapsed and is too weak to get up (see photo). You examine her and find T=102F, HR=130, and RR=42. Her heart is pounding very loudly. The mucous membranes of her eyes, mouth and vulva are all very pale. You diagnose an acutely bleeding abomasal ulcer. What is the most important treatment?



- 4 to 8 liters of fresh whole blood IV
- 20 liters of 1.3% sodium bicarbonate IV
- 40 liters of saline IV

- 40 liters balanced electrolytes orally
- 4 liters of commercial plasma IV plus vitamin K

Explanation - In the case of an acute blood loss such as this, the most important treatment is **whole blood**. Other sodium-containing fluids may be beneficial while the blood is being collected if this will not result in losing time in getting the whole blood into this cow. In most cases the single blood transfusion results in recovery. After about 24 hours the cow will exhibit melena as the digested blood reaches the rectum.

Question

After you make a diagnosis of *Hypoderma lineatum* in a herd of beef cattle, the owner asks how the warble got there and what its life cycle. You explain the difference between *Hypoderma lineatum* and *Hypoderma bovis*. What is the difference in life cycle between the two?

- L3 larvae of *H. lineatum* migrate to the esophagus, while L3 larvae of *H. bovis* migrate to the epidural fat of the spinal cord
- L3 larvae of *H. bovis* migrate to the esophagus, while L3 larvae of *H. lineatum* migrate to the epidural fat of the spinal cord
- L1 larvae of *H. bovis* migrate to the esophagus, while L1 larvae of *H. lineatum* migrate to the epidural fat of the spinal cord
- L1 larvae of *H. lineatum* migrate to the esophagus while L1 larvae of *H. bovis* migrate to the epidural fat of the spinal cord

Explanation – The correct answer is L1 larvae of *H. lineatum* migrate to the esophagus while L1 larvae of *H. bovis* migrate to the epidural fat of the spinal cord. L3 larvae of both *H. lineatum* and *H. bovis* are on the subcutaneous tissue of the back (L2 larvae migrated there and then molted to L3 larvae), where they drill an air hole and then grow before falling out on to the ground, pupating for 1 to 3 months before becoming a short-lived fly.

Question

Each year, hide damage due to this organism results in tremendous economic loss in cattle.

- *Sarcoptes scabiei*
- *Chochliomyia hominivorax*
- *Ornithodoros coriaceus*
- *Hypoderma bovis*

Explanation - The correct answer is *Hypoderma bovis*. *H. bovis* is also known as the cattle grub, heel fly, or warble fly. The life cycle starts with the female attaching up to 500 eggs to the hairs around the hocks and lower portions of the cow. First-stage larvae will hatch in just a few days and burrow into the skin. At this point, they migrate towards the epidural fat in the spinal canal (*H. bovis*) or via the esophagus (*H. lineatum*). After several months, they become L2s and migrate to

the subcutaneous tissues of the back where they will reach puberty, molt once more, and become L3s. Once they are L3s, swellings on the cows' backs can be felt. After 5-11 weeks, the L3s mature and burst through the skin, dropping on the ground where they will become adults in another 1-3 months.

Cochliomyia hominivorax (aka screwworm) lays its eggs on skin wounds. The developing maggots feed on the flesh and can lead to multiple infestations from additional screwworms and other flies.

Ornithodoros coriaceus (aka Pajahuello tick) is a soft tick that feeds on many different mammals and birds. This tick has become somewhat famous because it appears to transmit epizootic bovine abortion.

Sarcoptes scabiei (aka scabies mange mite) causes mechanical and chemical irritation and intense pruritus, leading to loss of milk production and damage of hides due to scratching. Although this is a possible answer, the economic impact of *Sarcoptes scabiei* is not as worrisome as with *Hypoderma bovis*.

Question

Several steers in a feedlot have interdigital lesions as shown in this image. They are lame and the lesion appears to be painful. You diagnose interdigital necrobacillosis or infectious footrot. Which of the following is the most effective feedlot treatment?



- Table all lame cattle and treat lesions with tetracycline bandages
- Flunixin daily for 10 days
- Walk all cattle in the feedlot through a formalin footbath daily for 5 days
- Chloramphenicol IM daily for 5 days
- Florfenicol SQ, one dose

Explanation - One dose of 40 mg/kg florfenicol is reported to be an effective therapy and would be favored by a feedlot because the single treatment would avoid costly repeated handling. The use of chloramphenicol is prohibited in cattle in the USA.

Question

A beef cattle farmer from California has had recurrent problems with roundworm infestations of *Ostertagia ostertagi*. The fall rains are approaching and, historically, this has been a time when he has had large numbers of cattle become ill. You randomly select 10 animals to perform a fecal egg count on and do not find elevated egg levels.

What do you suspect is occurring and what will you recommend?

- The cattle are suffering from type I ostertagiasis; treat with fenbendazole
- The cattle are suffering from type I ostertagiasis; treat with levamisole
- The cattle are suffering from type II ostertagiasis; treat with ivermectin
- The cattle are unlikely to have an outbreak this year; no treatment is needed
- The cattle are suffering from type III ostertagiasis; treat with fenbendazole

Explanation - Outbreaks in autumn into winter and low egg counts are associated with type II ostertagiasis. In this manifestation of disease, there are thousands of inhibited early **fourth-stage larvae** ready to exit the abomasal glands. Once a full blown type II infection occurs, many larvae emerge, causing **dysfunction of the abomasum** and possibly leading to **severe albumin loss, diarrhea, and even death**. As a reminder, Type II *Ostertagia* is the disease that causes a "Moroccan leather" appearance to the abomasum.

In contrast, type I ostertagiasis occurs in winter and spring following rapid infection with large numbers of L3 larvae from heavily contaminated pastures. Egg counts in this scenario tend to be much higher and clinical disease is most common in younger animals after weaning. However, in older animals, after invading the abomasal mucosa, many of the larvae inhibit their development at the L4 stage and wait to emerge and cause type II disease.

As for treatment, benzimidazoles (i.e. fenbendazole) and ivermectin are generally more effective than levamisole but all are treatment options.

Question

What is the current recommendation for cows diagnosed with *Mycoplasma bovis* mastitis?

- Frequent milking (every 1-2 hours)
- Systemic antimicrobials
- Anti-inflammatories
- Cull

Explanation - The correct answer is cull. Unfortunately, there is very poor response to treatment and since this is a very contagious organism, it is best to cull. Other types of mastitis, such as

Strep ag or coliform mastitis, may respond well to frequent milking, anti-inflammatories, and antibiotics.

Question

While visiting a herd of beef cows, you note several of them with achromotrichia. What may be causing this condition?

- Vitamin C deficiency
- Lead toxicity
- Copper deficiency
- Dermatophilus congolensis
- Cheyletiella

Explanation - Achromotrichia means an absence of pigment in the hair, so a black animal would develop **reddish hair**. Other clinical signs of copper deficiency can include **diarrhea, poor body condition, lameness, anemia, and infertility**.

Dermatophilus congolensis results in crusty lesions, usually along the spine, which are usually due to and exacerbated by damp conditions. Cheyletiella, also called "walking dandruff", is caused by a mite and is usually seen in dogs and cats. Vitamin C deficiency is very rare in ruminants and may cause crusting, alopecia, and pruritus. Lead toxicity will lead to neurological clinical signs.

Question

A recently freshened 4-year old Guernsey with a body condition score of 4/5 presents for decreased milk production, anorexia, and depression. On physical exam, she has a mild fever and is ketotic. No pings were auscultated during the physical exam and a rectal exam was unremarkable. What is the most likely diagnosis?

- Oleander toxicity
- Pyrrolizidine alkaloid toxicity
- Right displaced abomasum
- Fatty liver syndrome

Explanation - The correct answer is **fatty liver syndrome**. Fat cows are more predisposed to fatty-liver syndrome when they encounter a negative energy balance. Shortly after parturition, their energy needs increase dramatically with lactation. Clinical signs are vague so you must be able to reach the answer by paying attention to the signalment. Further, an RDA will present with much more systemic signs and you will be able to hear a ping. PA toxicity and oleander toxicity are possible but less likely given the signalment and clinical signs. Remember, oleander is cardiotoxic and causes arrhythmias and PAs will cause chronic damage to the liver.

Question

You are in the process of giving a cow a blood transfusion and begin to notice tachycardia, dyspnea, ptyalism, and rough lung sounds. Which of the following is NOT a treatment option?

- Antihistamine
- Dexamethasone phosphate
- Oxygen
- Diazepam
- Epinephrine

Explanation - The correct answer is diazepam. The clinical signs that are described are those of an anaphylactic reaction to the transfusion. Diazepam will not help you in this situation. Epinephrine, antihistamines, dexamethasone, IV fluids and oxygen are all possible treatment options.

Question

Most foodborne illness in the United States is caused by which of the following?

- Bacteria
- Fungi
- Protozoa
- Nematodes
- Viruses

Explanation - The correct answer is viruses. According to the CDC, about 2/3 of foodborne illnesses in the United States are caused by small round-structured viruses (Norwalk-like caliciviruses)

Question

You arrive at a dairy that has several lactating cows that are pale, icteric, and showing hemoglobinuria. You perform blood work and see no signs of methemoglobinemia or Heinz bodies. Phosphorus levels range between 1.6 and 2.0 mg/dl. What is your diagnosis?

- Babesia
- Postparturient hemoglobinuria
- Onion toxicosis
- Copper toxicity
- Anaplasmosis

Explanation - The correct answer is postparturient hemoglobinuria. The key to correctly answering this question is to know that phosphorus levels less than 2.0 mg/dl will most likely result in hemolysis. Paying attention to the fact that these cows are lactating should also help you to reach the correct diagnosis. Copper and onion toxicity will both cause methemoglobinemia. Anaplasmosis does not result in hemoglobinuria.

Question

A 2-year old Holstein cow presents for right hind limb lameness. On physical exam, you are able to extend the hock and concurrently flex the stifle. What is your diagnosis?

- Ruptured peroneus tertius
- Ruptured gastrocnemius
- Ruptured serratus ventralis
- Ruptured cranial cruciate ligament

Explanation - The correct answer is **ruptured peroneus tertius**. The ability to extend the hock and flex the stifle at the same time is diagnostic. This is not normal! A ruptured gastrocnemius will result in flexion of the hock with concurrent extension of the stifle. A ruptured serratus ventralis is incorrect because that muscle is on the front end of the cow. This muscle originates at the lateral thoracic wall and inserts on the medial surface of the scapula. If the serratus ventralis ruptures you will see a diagnostic "flying scapula". A ruptured cruciate ligament would just produce a drawer movement at the level of the stifle. These are difficult to diagnose because it is difficult to perform a drawer test on cattle.

Question

Which of the following is a cause of foodborne illness in people that causes hemorrhagic diarrhea and is associated with hemolytic uremic syndrome (HUS) in susceptible individuals?

- Hepatitis A virus
- Bacillus cereus
- Escherichia coli O157:H7
- Salmonella
- Listeria monocytogenes

Explanation - **E. coli O157:H7** is an enterohemorrhagic strain of E. coli that produces "Shiga-like toxins" which cause illness.

Common signs of infection are severe, **acute hemorrhagic diarrhea** and **abdominal cramps**, usually without fever. In most cases, the illness resolves in 5 to 10 days.

Children under 5 years of age and the elderly are at increased risk of developing hemolytic uremic syndrome (HUS) leading to **renal damage or failure**. HUS is a major cause of acute renal failure in children, and most cases are associated with Escherichia coli O157:H7.

The other choices listed here are all potential foodborne infections, but only Salmonella and B. cereus tend to cause diarrhea, and none are associated with HUS.

Question

Which group of drugs cannot legally be used in an extra label manner in the United States on food producing cattle?

- neomycin, gentamicin, sulfamethazine, estradiol, sodium iodide, prostaglandins
- tetracycline, penicillin, florfenicol, sulfas, ampicillin, estradiol, prostaglandins
- diethyl stilbestrol, chloramphenicol, nitroimidazoles, clenbuterol, fluoroquinolones, vancomycin, nitrofurans
- monensin, ivermectin, fenbendazole, moxidectin, lasalocid, decoquinate

Explanation – The correct answer is diethyl stilbestrol, chloramphenicol, nitroimidazoles, clenbuterol, fluoroquinolones, vancomycin, nitrofurans. In addition, it is not permitted to use **phenylbutazone** and **most sulfas** in adult dairy cattle. The rules are under the FDA and part of AMDUCA, the Animal Medicinal Drug Use Clarification Act.

Question

You examine a 4-year old Holstein dairy cow which freshened 2 weeks ago. She has a history of abrupt cessation of lactation and loss of interest in feed. HR=90 and RR=30. The cow has an arched back and is treading and swishing her tail frequently. On rectal exam you find an enlarged and painful left kidney. You catch urine in a cup after stimulating her to urinate and find pus and blood present. The smear you make and examine under the microscope has Gram negative rods in it, which you assume are most likely to be E. coli. Which of the following treatments is most appropriate?

- Chloramphenicol
- Vancomycin
- Gentamicin
- Ceftiofur
- Enrofloxacin

Explanation - **Ceftiofur** is likely to be effective against **acute coliform pyelonephritis**, as would ampicillin, penicillin, or tetracycline but ceftiofur has no withdrawal time needed. Gentamicin has a very long withdrawal time and is a poor choice. The other three choices are all prohibited in food animals in the United States.

Question

You perform a joint tap on a swollen carpus of a bull and obtain the following results: total protein 4.7 g/dl, total nucleated cell count 26,900/ul, 84% neutrophils. What is your interpretation of these results?

- Normal
- Unlikely to be infected
- Likely to be immune mediated joint disease
- Likely infected

Explanation - The correct answer is **likely infected**. Guidelines for an infected joint are as follows: total protein greater than **4.5 g/dl**, total nucleated count greater than **25,000/ul**, and polymorphonuclear cell count greater than 20,000/ul.

Question

A rancher's favorite bull has a lesion in the interdigital area of the left front foot (see image). The bull has recently become slightly lame on the left front leg. You tell the rancher that it is a corn. The owner wants you to fix it. What treatment should you undertake?



- General anesthesia and careful dissection to surgically remove the mass
- Surgical removal using sedation and local anesthesia
- Procaine penicillin IM daily for 5 days
- Tetracycline topically daily
- Inject 10% formalin into the lesion

Explanation - These are best handled by **surgically removing the mass**, being careful not to invade the interdigital fat pad. The area is then bandaged and the claws can be temporarily wired together if it appears necessary. Wiring the claws is often not necessary if you only remove skin deep.

Question

It is March and you are called to a beef ranch because several beef cows on lush pasture have been found dead and another is staggering, according to the rancher. By the time you arrive this cow is down on her side with her legs paddling. The HR=140 and is pounding, while T=103F. The eyelids are fluttering, there is nystagmus, and champing of the jaws. Which of the following disorders fits these signs best?

- Lead poisoning
- Hypomagnesemia

- Hypokalemia
- Copper deficiency
- Hypocalcemia

Explanation - **Hypomagneseemic tetany** (**grass tetany**) can cause all of these signs. It usually occurs in cold or cool weather in pastured lactating beef or dairy cows. Lush pastures that are high in potassium and nitrogen and low in magnesium and sodium are most often involved. Hypocalcemia may cause similar signs in periparturient cows (milk fever).

Question

What gram positive organism is an obligate pathogen of the mammary gland of cows?

- Staphylococcus aureus
- Streptococcus agalactiae
- Mycoplasma
- Corynebacterium bovis

Explanation - The correct answer is **Streptococcus agalactiae**. This organism usually causes **subclinical mastitis**, but sometimes you may see high somatic cell counts and clinical signs with this organism. Perform a CAMP reaction to diagnose this organism. That is when you plate *S. aureus* and *S. agalactiae* and you see them act together to lyse red blood cells. This creates a clearing on your culture plate.

Question

During a visit to a dairy, several cows are noted to have 1-3 cm cysts on their backs with small holes at the center resembling breathing pores created by larvae. If these are breathing pores, what organism are the cows infected with?

- Hypoderma
- Sarcophaga
- Anopheles
- Simulium
- Culicoides

Explanation - The correct answer is *Hypoderma bovis* or *H. lineatum*. *Hypoderma* is also known as the cattle grub, heel fly, or warble fly. The life cycle begins with the female attaching up to 500 eggs to the hairs around the hocks and lower portions of the cow. First-stage larvae will hatch in just a few days and burrow into the skin. At this point, they begin their tour de cow and migrate towards the epidural fat in the spinal canal (*H. bovis*) or via the esophagus (*H. lineatum*). After several months in this beautiful location, they become L2s and migrate to the subcutaneous tissues of the back where they will molt once more, and become L3s. Once they are L3s, the swelling on the cows' backs can be felt. After 5-11 weeks, the L3s mature and burst through the skin, dropping

on the ground where they will become adults in another 1-3 months. Sarcophaga spp are known as the flesh flies. An adult female will deposit her eggs in wounds and ulcers; the larvae then feed off the wounds. Eventually, they mature into L3s and fall off to pupate on the ground.

Simulium flies are also known as buffalo gnats or black flies. Adult females are the key problem with these flies because they suck blood! They prefer the legs, abdomen, head, and ears.

Additionally, they will only eat during daytime. Female flies are an annoyance to cows and cause decreased productivity.

Anopheles are just mosquitoes; however, they are the most important vectors of human malaria and spread West Nile Virus.

Culicoides are also known as no-see-ums, biting midges, and punkies. They are a great annoyance to cows and have the potential to transmit bluetongue and Onchocerca. In horses, they are thought to be the cause of sweet itch, a Type I hypersensitivity to their saliva.

Question

A beef cow presents with blepharospasm and chemosis. You perform a fluorescein stain and see a centrally located ulceration of the cornea. Which is NOT a treatment option?

- Florfenicol
- Penicillin G subconjunctivally
- Chloramphenicol
- Long-acting oxytetracycline IM or IV

Explanation - Chloramphenicol is NOT a treatment option. This drug is not labeled for use in food animals and is prohibited for food animals in the USA, with the possibility penalty of losing one's license. Benign neglect is not an incorrect answer because these ulcers usually heal with time. The only down side is all the morbidity you will get for not treating. Further, these are classical clinical signs for **infectious bovine keratoconjunctivitis**, most commonly caused by **Moraxella bovis**, which is most common in calves.

Question

A 3-year old open beef cow presents as a result of lameness in her right hind limb. Upon physical examination, you notice an ulcerated necrotic lesion in the interdigital space. Which of the following is NOT a differential diagnosis?

- Bovine viral diarrhea
- Infectious bovine rhinotracheitis
- Malignant catarrhal fever
- Interdigital necrobacillosis
- Foot-and-Mouth disease

Explanation - The correct answer is **infectious bovine rhinotracheitis**. There are three subtypes of infectious bovine rhinotracheitis identified. BHV-1.1 (Bovine herpes virus) is responsible for respiratory infections. BHV-1.2 may cause genital infections and respiratory disease. BHV-1.3 (reclassified recently and now called BHV 5) has been known to cause neurologic infections. Since

most people are not aware of the reclassification, this aspect of the issue is unlikely to be questioned on a board examination. All of the other listed answer choices can cause the lesion described in the question.

Question

You examine a Holstein steer with the complaint of poor appetite, depressed attitude, and ventral swelling. You note a normal TPR, but he has a large ventral swelling that pits on palpation (see image). On rectal exam, a small bladder is palpable. What is the correct diagnosis?



- Umbilical hernia
- Penile hematoma
- Ruptured bladder
- *Corynebacterium pseudotuberculosis* infection
- Ruptured urethra

Explanation - In the bovine, urolithiasis often results in **rupture of the urethra**. Urine then leaks into all the ventral tissues and causes this **massive ventral edema**, which progresses to necrosis and sometimes to gangrene.

Question

You are called by a rancher and asked to examine a 3-year old beef cow he purchased 4 weeks ago and turned out in the hills of California. The complaint is that she appears weak and disoriented, and even a little belligerent. On exam, you find T=**105F**, HR=110, and RR=45. The heart is pounding very loudly and you note a number of ticks on her. Mucous membranes are pale (see image of her vulva), but urine and feces appear normal. Other parameters are not notably abnormal. Which of the following diseases best fits this cow`s clinical signs?



- Piroplasmosis (Babesiosis)
- Porphyria
- Bacillary hemoglobinuria (Clostridium novyi type D)
- Anaplasmosis
- Purpura hemorrhagica

Explanation – The correct answer is **Anaplasmosis**. This tick-borne disease has an incubation period of 2 to 4 weeks, and causes these exact signs. **Tetracycline** is the best treatment.

With piroplasmosis or Clostridium novyi type D infection (bacillary hemoglobinuria), one would expect intravascular hemolysis and **hemoglobinuria** (dark urine).

Question

A local purebred cattle herd has been increasingly affected with papillomas to the point that it is now a problem throughout the herd, and the owner is concerned. Which of the following treatment options would yield the best results?

- Depopulate the herd
- Prepare an autogenous vaccine by isolating some warts from the herd
- Treat herd with acyclovir
- Purchase commercially available vaccine

Explanation - The correct answer is to **prepare an autogenous vaccine** by isolating some warts from the herd. The commercially available vaccine is thought to be effective only against the same strain; therefore, it is not curative in many cases. Treating with acyclovir is not recommended. The least desirable treatment option would be depopulation of the herd. This would potentially be financially devastating.



Question

You arrive at a ranch that has had a die-off of 12 beef cows. You walk out and notice that they do not display rigor mortis. You also note that they have fresh, non-coagulated blood coming out of their nose and mouth. The owner wants to know if he can use the meat. What will you do next?

- Perform a necropsy on site on one of the animals to determine if it is safe for the owner to use the meat
- Tell the owner that he may use the meat as long as he cooks it thoroughly
- Obtain a biopsy of the spleen for analysis
- Obtain some vitreous humor for analysis
- Obtain a liver biopsy for analysis

Explanation - The correct answer is to **obtain vitreous humor for analysis**. The clinical signs are those of **anthrax**. The last thing you want to do is open up the body and expose the organism to oxygen. If you do, the anthrax will **sporulate** and be extremely resistant in the environment and now you will have contaminated the area.

Therefore, you should not do anything to the body that will involve cutting into it such as biopsies or using it for meat. The next step is to submit vitreous humor or blood from an ear scrape to confirm your tentative diagnosis. You will also need to report this to state authorities.

Question

In copper deficiency, animals may suffer from achromotrichosis (pale hair coat) as a result of this enzyme not working properly. What is the enzyme?

- Tyrosinase
- Glutathione peroxidase
- Myophosphorylase
- Lysyl oxidase

Explanation - The correct answer is **tyrosinase**. This enzyme converts **L-tyrosine to melanin**. Lysyl oxidase is involved with synthesis of collagen in connective tissue and it is also dependent on adequate copper levels. Glutathione peroxidase is involved in free radical protection, and selenium is necessary to keep this enzyme going. Myophosphorylase is a muscle enzyme that is associated with a genetic disease of Charolais cattle.

Question

A 7 year old Jersey cow presents to you with anorexia, bottle jaw, brisket edema, and a true jugular pulse. She has a heart rate of 90 bpm, rapid respiration, and is depressed. What is your primary differential?

- Generalized lymphangitis
- Anaplasmosis
- Right heart failure
- Salt poisoning

Explanation - The correct answer is **right heart failure**. As a result of an inability to pump blood, it backs up and edema and a true jugular pulse occur.

Question

During a necropsy of a 3-year old cow with a history of weight loss and diarrhea, you notice thickened mucosal folds in the abomasum (with less shiny mucous than normal), and thousands of larvae are detected when you digest and stain the abomasal mucosa. What did this cow potentially die from?

- Type I Haemonchus contortus
- Type II Ostertagiasis
- Giardiasis
- Coccidiosis
- Type I Ostertagiasis

Explanation - The correct answer is **Type II Ostertagiasis**. This is a classic description of postmortem findings. Type I Ostertagiasis is found in naive calves and is not associated with large numbers of larvae with few adult worms in the abomasum. Type II Haemonchus contortus is possible, but it mainly causes anemia, as it is a blood sucker. Also, H. contortus most commonly severely affects sheep and goats. Coccidiosis and giardiasis are mainly calf diseases.

Question

A cow presents for decreased milk production. On physical exam, the cow has a fever of 104.5F. Her urine is yellow, and the dipstick tests are normal. You make a blood smear and see an organism at the margin of the red blood cells. What is your treatment of choice for this animal?

- Chloramphenicol

- Procaine Penicillin
- Corticosteroids
- Oxytetracycline

Explanation - The correct answer is oxytetracycline. The cow has **Anaplasmosis**, a rickettsial organism that is transmitted by ticks. Infected calves have a low mortality rate, but adult cattle have a 20-50% mortality rate with this disease.

Absence of Hemoglobinuria rules out **Babesiosis**, **Theileriosis** and **Bacillary hemoglobinuria**.

Babesia Treatment: Imidocarb dipropionate (Imizol), Diminazene aceturate (Berenil).

Question

It is the middle of summer, and located in a pasture with a marshy area, several cattle are found dead. The only clinical sign observed by an employee was red urine. You perform a necropsy on one of the affected animals and notice that urine is dark red and all body fluids are icteric and hemorrhagic. There is evidence of hemorrhage in the abomasum and reticulum. Finally, the liver has an anemic infarct near the portal vein. What are these animals infected with?

- Salmonella typhimurium
- Anaplasma marginale
- Leptospira pomona
- Clostridium hemolyticum (Cl novyi type D)

Explanation - The correct answer is **Clostridium hemolyticum**, now more properly called Cl novyi type D, which causes bacillary hemoglobinuria. The organism resides in the liver until anaerobic conditions develop, and then they start replicating and producing toxins. The finding of an anemic infarct on necropsy is classic for red water disease. Liver flukes are often associated with the disease, as they cause the anaerobic tracts needed for the organism to bloom. Marshy areas with snails are part of the liver fluke cycle of transmission.

Anaplasmosis is not a good answer choice because there is no hemoglobinuria associated with the disease. The same goes for Salmonella. Leptospirosis is a good differential given the history; however, necropsy findings are consistent with bacillary hemoglobinuria.

Question

There is an appointment today for a work-up on a lame cow. "Playing the odds", what digits are most likely to be involved, because these are the digits most often affected in dairy cattle?

- Lateral front digits
- Lateral rear digits
- Medial rear digits
- Medial front digits

Explanation - The correct answer is lateral rear digits. Over 80% of foot disease involving the digits involves the rear digits. Additionally, approximately 85% of these involve the lateral aspect. This is because they bear the majority of their rear limb weight on the lateral claw in the hind. In the front, cattle put most of their weight on their medial claw.

Question

You go to a ranch to evaluate the sudden death of a bull. There is black, bloody discharge from all orifices. There is incomplete rigor mortis despite being dead for a day. What is your most likely diagnosis?

- Grass staggers
- Anthrax
- Moldy sweet clover toxicity
- Botulism
- Tetanus

Explanation - The correct answer is anthrax. Anthrax is caused by *Bacillus anthracis*. The black blood from the orifices, incomplete rigor mortis, and acute death is very characteristic of the disease in cattle. Lesions occur in the reticuloendothelial system and vasculature. Do not perform a necropsy on the animal as you would potentially release spores into the environment. You should notify the authorities if you suspect the disease.

Question

You are out to examine cattle at a beef ranch and the rancher mentions that there has been investigation regarding a possible *E. coli* O157:H7 outbreak at a nearby herd. He wants to know what sign(s) infected cows would be most likely to display. What is the best answer?

- Seizures
- Hematochezia
- Dehydration
- Inappropriate mating behavior
- Weight loss
- No symptoms

Explanation - *E. coli* O157:H7 is a concern because of its zoonotic potential and not because of pathology seen in cattle as infected animals are typically asymptomatic. The bacteria are spread through fecal-oral transmission, most commonly by contamination of food or water supplies. Recent outbreaks in North America have involved contamination of foods (vegetables such as spinach and lettuce). The major sign seen in humans is hemorrhagic colitis.

Question

You are called early one cold spring morning to see a 5-year old dairy cow which is down in the corral. She freshened three days ago and is fed TMR. You find her to be barely responsive and unable to assume or maintain sternal recumbency, T=98F, Hr=100/min and weak, and there is no rumen motility. The uterine lochia is red and mucoid. On rectal exam you find normal feces and a full bladder. How should you treat this cow?



- Broad spectrum antibiotics
- IV magnesium
- IV saline, large volumes
- IV calcium
- Blood transfusion

Explanation - This cow has the history and classic signs of **hypocalcemia**, also called milk fever. Skeletal, cardiac and smooth muscle weakness lead to the signs, and she is unable to maintain her body temperature in cold weather.

Question

A 1-year old unvaccinated Angus steer presents as a result of acute lameness and depression. He has historically been healthy and one of the best animals in the group. On physical exam, there are no signs of trauma and the steer is febrile. A crepitant, edematous swelling is seen on the muscles of the left shoulder. It is hot and painful to the touch. Assuming there are no signs of trauma, what is the most likely diagnosis?

- Clostridium hemolyticum
- Clostridium difficile
- Corynebacterium pseudotuberculosis
- Mycoplasma bovis
- Clostridium chauvoei (blackleg)

Explanation - The correct answer is **Clostridium chauvoei** (blackleg). Clostridium chauvoei results in infection after gaining access to the blood stream via the alimentary tract and then depositing in muscle. This is a serious disease, and animals will die if left untreated. Cattle should be vaccinated at 3 to 4 months of age against this and other Clostridial diseases. Clostridium hemolyticum causes liver lesions, and the toxin results in acute hemolysis and often in death. Clostridium difficile usually results in gastrointestinal disease in horses. Corynebacterium pseudotuberculosis results in large external bleeding sores on the skin of cattle and boils and internal abscesses in sheep and goats. Mycoplasma bovis can cause sepsis, joint infections and mastitis.

Question

When formulating late gestation anionic diets for dairy cows to help prevent hypocalcemia in the last 2 to 3 weeks prior to calving, what formula is used?

- $DCAD = (Na - K) + (P - S)$
- $DCAD = (Na + K) - (Cl + S)$
- $DCAD = (Na + Cl) - (K + S)$
- $DCAD = (Na + S) - (K + Cl)$
- $DCAD = (Na - Cl) + (K - S)$

Explanation - DCAD stands for Dietary Cation Anion Difference. Na=sodium, K=potassium, Cl=chloride, and S=sulfur. These are the 4 most important strong ions to be considered. When the diet is optimal the urine pH of Holstein cows should range between 6.2 and 6.8 for cows on the ration.

Question

You diagnose an Angus beef cow with ocular lymphoma. What should you recommend to the owners?

- Exenteration of the eye
- Injectable chemotherapy
- Euthanasia
- Enucleation of the eye
- Corticosteroid therapy

Explanation - The correct answer is **euthanasia**. **Meat from cattle affected with lymphoma cannot be used**. Treatment for the disease is economically unadvisable for beef cattle. Enucleation is not likely to cure the disease as it is **likely systemic**.

Question

You are in a dairy performing pregnancy checks and notice white plaques on the vagina of the 27th cow that you rectal. What is your diagnosis?

- Infectious pustular vulvovaginitis

- Squamous cell carcinoma
- Melanoma
- Vaginal prolapse

Explanation - The correct answer is **infectious pustular vulvovaginitis**. This is another clinical manifestation of herpes virus. Clearly, this is not a vaginal prolapse since there is no straining or prolapsed tissue. Squamous cell carcinoma is possible but will most likely present as an ulcerated region or proliferative lesion. Melanoma is rare in cattle and will probably be a black to gray proliferative nodule or nodules if it is seen.

Question

Mycobacterium bovis is an important zoonotic disease spread from cattle to humans which can be controlled by testing and removal. Recently, new sources of infection for cattle which act as a reservoir have been discovered in the USA. Where are these reservoir sources of infection?

- Wildlife (deer)
- Birds feeding on farms
- Humans with Mycobacterium tuberculosis
- Sheep
- Donkeys

Explanation - In the USA, the most common reservoir infecting cattle are **white tailed deer**; **badgers** in Great Britain; **brushtail possums** in New Zealand. These reservoirs make control and eradication very difficult.

Question

What is the major mode of transmission of contagious mastitis causing organisms in cows?

- Transmission as a result of calves suckling
- Transmission by contact with other infected individuals
- Transmission by injury to the teat
- Transmission by the milker's hands and milking equipment

Explanation - The correct answer is transmission by **milker's hands and milking equipment**. This is the main factor in the spread of mastitis, and you must work closely with your client in training personnel to apply proper milking techniques.

Question

You are presented with a Longhorn steer with a large bloody sore on its left side just behind the scapula (see image). There is pus and serum mixed with blood. Once you clean away this material, there appears to be a large open superficial sore, slightly raised (excoriated granuloma). The

impression smear you make is full of intracellular pleomorphic gram positive rods. What organism is causing this lesion?



- *Corynebacterium pseudotuberculosis*
- *Staphylococcus aureus*
- *Streptococcus bovis*
- *Corynebacterium bovis*

Explanation - The lesions of *C. pseudotuberculosis* in cattle, horses, sheep and goats are all rather different by species. In horses one sees pectoral and ventral abscesses, or even internal abscesses. In sheep and goats, the organism causes caseous lymphadenitis.

In cattle, as seen here, the lesions tend to be on the sides, perhaps initiated by a skin scratch from a fence. Most lesions **heal spontaneously in 3 to 4 weeks** and, although they attract flies, they are **not a significant disease in cattle**.

Question

You are routinely checking purebred Holstein calves for failure of passive transfer (FPT) at 48 to 60 hours of age and discover one with a very low serum IgG. The calf weighs 40 Kg. Which of the following is the most effective course of action to correct the problem and maintain a healthy calf?

- Give 2 liters of colostrum orally twice at 12 hour intervals
- Transfuse with 1 to 2 L bovine plasma
- Orally administer a colostrum supplement daily for the next 6 weeks
- Transfuse with 50 ml whole blood
- Give fluoroquinolone antimicrobial drugs daily for the next month

Explanation - The single most effective way to combat FPT in a 3-day old calf is to transfuse **20 to 40 ml/Kg body weight of plasma**. Some veterinarians would also advocate administering broad-spectrum antibiotics for several days. By 3 days, it is too late for oral colostrum to be an effective source of immunoprotection due to poor absorption of immunoglobulin.

Question

All of the following **food-borne infections** cause primarily gastrointestinal signs except for _____.

- Escherichia coli O157:H7
- Yersinia enterocolitica
- Listeria monocytogenes
- Shigella
- Campylobacter

Explanation - The correct answer is Listeria monocytogenes. Listeria is an opportunistic pathogen that grows slowly in refrigerated foods. It can cause **abortions or stillbirths** in humans, otherwise illness is usually mild. Campylobacter is a common food borne infectious cause of **diarrhea in young adults**; neurologic complications are uncommon. Escherichia coli O157:H7 is an adulterant found in beef that can cause **severe gastrointestinal signs**. Shigella causes **bacillary dysentery** in humans. Vibrio cholera usually comes from **shellfish** and causes gastrointestinal signs in humans. Yersinia enterocolitica is a zoonosis usually from swine that multiplies in refrigerated foods and causes gastroenteritis.

Question

When suturing closed a right paramedian incision on a cow, what is the holding layer for an interrupted suture pattern to prevent dehiscence or herniation?

- Subcutaneous fascia
- Muscle fibers of the rectus abdominus muscle
- Peritoneum
- Skin
- External sheath of the rectus abdominus muscle

Explanation - The **external rectus fascia** is the strongest layer and careful closure is critical for preventing dehiscence. Many people advise using interrupted sutures in this layer.

Question

The owner of a nearby dairy calls to have a wound on his heifer inspected. The wound is located ventrally, on the brisket, and there are larvae feeding on the tissue. The wound is approximately 5cm in diameter and has now become 6 cm deep as a result of larval feeding. As you approach the cow, you see a large, metallic blue-green colored fly leaving the wound. What is your diagnosis?

- Tabanus
- Stomoxys calcitrans
- Chrysops
- Cochliomyia hominivorax

Explanation - The correct answer is **Cochliomyia hominivorax**. This fly is also known as the **screwworm**. Females lay hundreds of eggs at the edge of fresh wounds on the cow; the larvae hatch in approximately **24 hours**. As the larvae eat the living tissue, they create a huge wound. Screwworm larvae then fall off and pupate, completing their life cycle in approximately 21 days. This fly is **reportable**!



Question

A 3-year old Holstein dairy cow, 3 weeks post partum, is presented with the complaint that she has dropped in milk production over the last several days. You perform a physical exam and the only abnormality you note is a large amount of ketone bodies in the milk and urine. You decide to administer **glucose IV** and **insulin SQ**. What else should this cow be administered?

- IM tetracycline
- IV calcium gluconate
- Oral propylene glycol
- SQ bovine somatotropin
- IM parathyroid hormone

Explanation - The **oral propylene glycol** will serve as a precursor for glucose production, and will help with the demands of lactation that are causing increased fat mobilization and ketosis. A fourth treatment that is sometimes used is **corticosteroids**, as they decrease milk production and increase gluconeogenesis.

Question

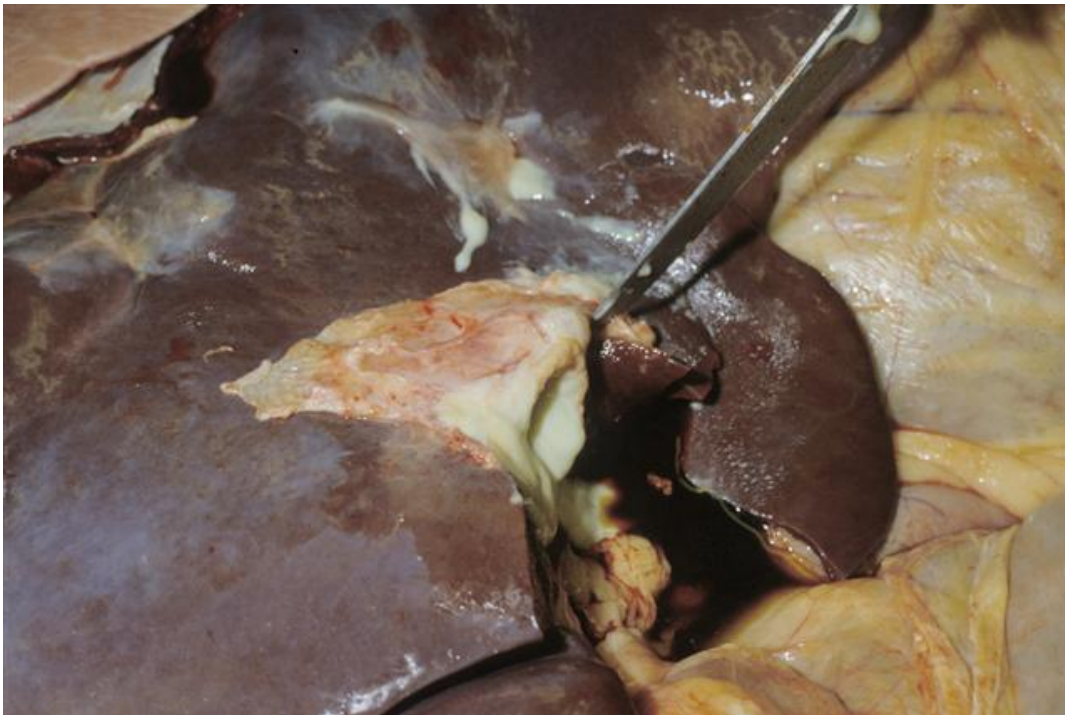
You examine a 4-year old Holstein dairy cow which freshened 2 weeks ago. She has a history of abrupt cessation of lactation and loss of interest in feed. T=105F, HR=90 and RR=30. The cow has an arched back and is treading and swishing her tail frequently. On rectal exam you find an enlarged and painful left kidney. You catch urine in a cup after stimulating her to urinate. Which description of the urine best fits what you would expect to find in this cow?

- Amyloid casts
- Cloudy and bloody
- Hemoglobinuria
- Crystals present
- Ketonuria

Explanation - This cow is likely to have **acute pyelonephritis**. It is most commonly **ascending** and associated with **E. coli**, **other coliforms**, or **Corynebacterium renale**. You could also use ultrasound to confirm the diagnosis, but finding neutrophils, RBCs and bacteria with these signs is indicative of acute pyelonephritis. **Ceftiofur** is likely to be effective against acute coliform pyelonephritis, as would **ampicillin**, **penicillin**, or **tetracycline** but ceftiofur has no withdrawal time needed.

Question

You are in charge of a slaughter house and are asked about why so many of the culled dairy cattle in a recent shipment have liver abscesses (see photo) and what can be done about it. The abscesses result in a significant financial loss for the owner because the liver is condemned, and he is concerned. What is the cause?



- Foot abscesses showering bacteria to the liver

- Rumen acidosis
- Traumatic reticuloperitonitis with hepatic involvement
- Black disease
- Liver fluke migration

Explanation - Dairy cattle which are fed a **high concentrate diet** should be gradually introduced to it. Even so, an **additional dietary buffer** may be needed. The herd veterinarian should check rumen pH on about 5 high-producing cows by needle stick of the rumen 2 to 3 hours after they are fed. If some fall below **pH 5.5**, additional sodium bicarbonate should be added to the ration.

The low rumen pH causes rumenitis allowing bacteria to translocate through the mucosa and be filtered from the hepatic portal circulation by the liver, resulting in one or more hepatic abscesses.

Question

A worried herdsman calls you out to assess one of his best cows that has developed a large 6-inch diameter sore on the flank with pus and blood associated with it. You suspect this lesion to be caused by *Corynebacterium pseudotuberculosis*. What should you tell the owner to do?

- Treat aggressively with systemic antibiotics
- Flush the wound and let it heal
- Slaughter immediately
- Euthanize immediately and incinerate the body
- Surgical debridement and call the state authorities

Explanation - The correct answer is **flush the wound and let it heal**. *C. pseudotuberculosis* manifests itself as sores and abscesses. They are most common on the lateral thorax, neck, flank, or head. It is thought that an injury can result in inoculation of the organism. Cows are relatively unaffected systemically, and the lesions will resolve on their own in 2-4 weeks.

Question

Bovine leukocyte adhesion deficiency (BLAD) is an autosomal recessive inherited trait of cattle. If two carriers are bred, what percentage of the offspring would be expected to be affected and have the disease?

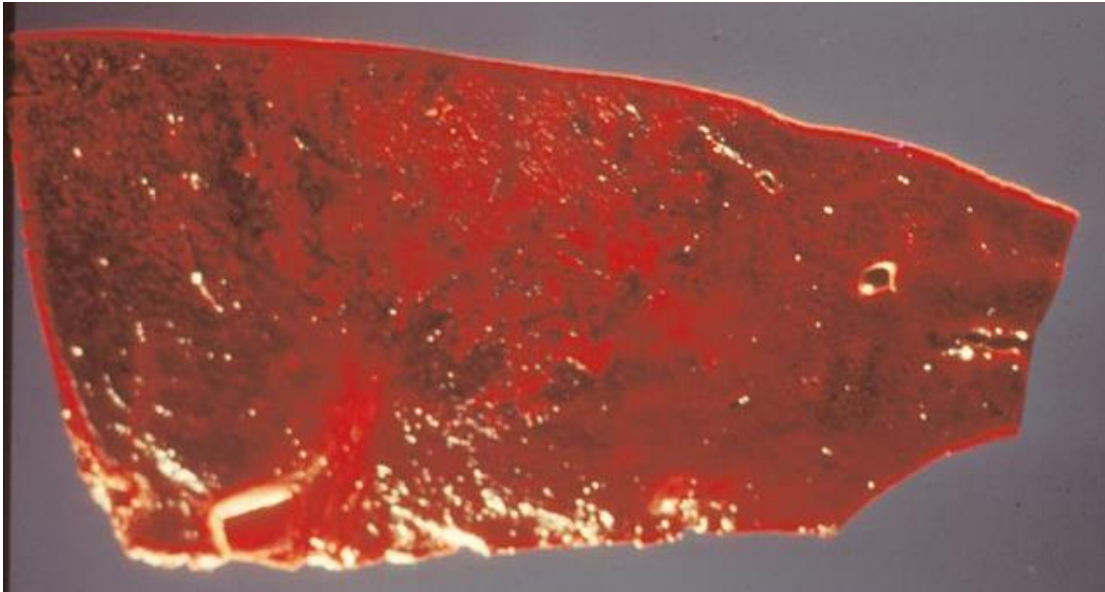
- 10%
- 0%
- 100%
- 50%
- 25%

Explanation - With any autosomal recessive trait, 25% of the offspring will be affected, 50% will be carriers and 25% will be normal non-carriers. (Remember your Punnett square.)

Question

The image shows an infarct in the liver discovered on post mortem exam of a mature beef cow which died one hour before in a western mountain pasture, after being observed to appear normal one day earlier. There is also dark red urine in the bladder. The pasture contains native plants, some pine trees, and a marshy area with water plants. The cows are unvaccinated and were never wormed.

Given this history and the lesion found, the most likely cause of death is _____.



- Viral hepatitis
- Blue-green algae toxicity
- Bacillary hemoglobinuria
- Pine needle poisoning

Explanation - Also known as **redwater**, **bacillary hemoglobinuria** is caused by germination of **Clostridium Novyi type D** spores in the liver after anaerobic damage by migrating liver fluke larvae. *Cl. Novyi* was formerly called *Cl. hemolyticum*. **Vaccination** can prevent this disease.

Question

On a visit to a feedlot, the rancher asks you what method she should use to euthanize sick cattle. Which of the following is considered an acceptable method of euthanasia for conscious cattle, according to the AVMA?

- Exsanguination
- Air embolism (intravascular injection of air)
- Gunshot
- Intravenous injection of bleach (sodium hypochlorite)
- Intravenous injection of xylazine followed by intravenous injection of potassium chloride

Explanation - According to the AVMA Guidelines for the Euthanasia of Animals, **gunshot** is the most common method used for on-farm euthanasia of cattle. The anatomic landmarks used for the point of entry should be the intersection of two imaginary lines drawn from the outside corner of the eye to the center of the base of the opposite horn (or equivalent position). The person euthanizing the animal should have sufficient training and experience with the firearm for a safe and accurate procedure. Although one well-placed bullet usually results in immediate loss of consciousness with little likelihood of return to consciousness, one should always be prepared to deliver a second or even a third shot if necessary.

Unacceptable methods for euthanasia of conscious animals include injection of chemical agents (disinfectants, electrolytes including potassium chloride, and nonanesthetic pharmacologic agents), drowning, air embolism, electrocution, and exsanguination. Administration of xylazine or other alpha-2 agonists followed by intravenous potassium chloride or magnesium sulfate is also considered unacceptable because alpha-2 agonists alone are recognized as being unreliable for producing generalized anesthesia although they can produce a state resembling it.

Question

You visit a dairy that has ongoing problems with mastitis. They ask you for advice on proper milking and maintenance of equipment. Which of the following statements is INCORRECT?

- Post dip all teats
- Replace the liner every 25 milkings
- Pre dip all teats
- Fore strip each quarter
- Shut off vacuum before removing the claw

Explanation - The incorrect answer is to replace the liner after 25 milkings. This is the best answer because the liner will last for at least **500 milkings**. There are three types of liners: synthetic rubber, natural rubber, and silicone. These are designed to last anywhere between **500 and 10,000 milkings**. Post-milking teat disinfection is probably the most effective way of reducing the rate of contagious mastitis. Pre-milking dip will help control environmental mastitis.

Question

Several 16 to 20 month old Holstein dairy heifers which have been out in pasture have developed large areas of skin sloughing, which appears to affect mainly the white unpigmented areas (see photo). Based on this observation, what is the best diagnosis?



- Insect hypersensitivity
- Photosensitization
- Ordinary sunburn
- Allergic dermatitis
- Malignant catarrhal fever, skin form

Explanation - Photosensitization mainly affects unpigmented skin where photodynamic agents have accumulated making the skin hyper-reactive to UV light. The cause of this photosensitization can be **primary**, in which case a plant-derived compound (such as **hypericum**) or chemical which is injected, ingested or topically applied, is the cause. Alternatively, the cause can be secondary due to **hepatic damage/failure** in which case the liver fails to remove ingested chlorophyll-breakdown products like **phylloerythrin**, which accumulates in the skin and results in UV damage (sunburn). You need to determine whether this is primary or secondary by **checking liver enzymes** and **bilirubin** levels.

Question

Which of these compounds must be given orally to cattle very carefully so as to avoid aspiration pneumonia?

- Mineral oil
- Water

- Sodium chloride
- Propylene glycol

Explanation - The correct answer is mineral oil. This is because mineral oil is a tasteless substance and animals will commonly aspirate it. The result is horrible aspiration pneumonia. Propylene glycol is commonly given to cows that are ketotic, since propylene glycol is a glucose precursor and helps stop ketotic cycles. Sodium chloride is commonly given with water to help replace electrolyte loss.

Question

A client brings the one-half inch grub shown in the image to you one spring day, telling you it emerged from a hole in the back of one of his prize show cattle. He wants to know what to treat his cattle with and when.



- Ivermectin in early fall
- Ivermectin in February
- Thiabendazole in early fall
- Moxidectin now, in spring
- Organophosphates in summer

Explanation - This is a cattle warble called **Hypoderma**. The 2 species are *H. bovis* and *H. lineatum*. They undergo a long migration in tissues and only emerge from the back of the animal in spring. The **crucial treatment time is early fall** when larvae are just beginning to migrate in tissues. Organophosphates or one of the macrocyclic lactones (ivermectin, doramectin, eprinomectin or moxidectin) are effective.

Question

It's summer, and a cattle ranch in a heavily irrigated pasture has just called you into action because there have been 10 acute deaths in the herd of 70. When you get there, you see other affected herd mates that are icteric, have port wine-colored urine, bloody diarrhea, are ataxic, stare blankly into space, are pale, and have petechiations. You perform blood work and see that there is anemia, azotemia, and hyperbilirubinemia. What is your likely diagnosis?

- Leptospirosis
- Anaplasmosis
- Post-parturient hemoglobinuria
- Clostridium hemolyticum

Explanation - The correct answer is Clostridium hemolyticum (recently renamed **C. Novyi Type D**, so be careful because the new name may be used). Infection of the liver by migrating flukes (Fasciola hepatica), results in anaerobic tracks that allow the Clostridium to bloom and cause disease.

Anaplasma marginale does not result in hemoglobinuria. Acute leptospirosis is more likely to affect calves, not vaccinated adults. Post-parturient hemoglobinuria is highly unlikely, since there was no indication that these were post parturient animals... and they are acutely dying. Treat with penicillin or oxytetracycline.

Question

Which of the following is not a cause of teat lesions?

- Vesicular stomatitis
- Anaplasmosis
- Bluetongue virus
- Herpes mammillitis
- Pseudocowpox

Explanation - The correct answer is Anaplasmosis, which is a cause of **extravascular hemolysis**. Pseudocowpox is a parapox virus and results in **proliferative teat lesions**. Vesicular stomatitis is a reportable disease caused by a rhabdovirus. It is reportable because it is similar in presentation to foot and mouth disease. Clinical signs include ulceration of the teats and mouth. Bluetongue and herpes mammillitis also result in ulcerative lesions.

Question

Which of these zoonotic infections are of most concern from drinking raw unpasteurized cow's milk?

- Salmonella typhi
- Clostridium botulinum
- Shigella
- Escherichia coli O157:H7
- Mycobacterium bovis

Explanation - The correct answer is **mycobacterium bovis**. M. bovis is a **very serious** zoonosis transmitted to humans by raw milk and has been largely controlled by institutional measures and milk pasteurization in the United States.

E. coli O157:H7 is found mainly in **raw ground beef** (probably fecal contamination). The other diseases listed are foodborne infections but of less serious concern in raw milk than M. bovis. S. typhi is the cause of typhoid fever and is not carried by farm animals, only by humans. Likewise, Shigella is a primate disease.

Question

In performing ocular ablation (removal) to treat severe cancer eye in a commercial beef cow, which of the following is the most appropriate anesthesia to use in the field?

- A five point orbital block using lidocaine
- General anesthesia using sodium pentathol (barbiturate)
- Sedation using xylazine and restraint in a squeeze chute
- Topical anesthesia using proparacaine or tetracaine
- General anesthesia using fluothane intubation following intramuscular Xylazine

Explanation - The correct answer is a five point orbital block using lidocaine. **Squamous cell carcinoma** is by far the most common ocular tumor in cattle and is referred to as "**cancer eye**". Treatment can vary resection of part of an eyelid to complete enucleation including the eyelids. Recurrence is common, as spread to the lymph node can occur if not caught early on.

The cow should be restrained in a **squeeze chute** and the head tied to one side so that the abnormal eye is accessible. The area should be closely clipped or shaved and disinfected, then generous amounts (**10 ml per site, 50 ml total**) of local anesthetic are injected using a **19 ga** 2.5 inch (6 cm) needle. The 5 injection sites include the **medial canthus**, and then **twice through each lid** so that the tissues around the globe are flooded with local. Alternatively the Peterson`s orbital nerve block (another local block) can be utilized.

Question

Bovine growth hormone is also called bovine somatotropin (BST). For which approved purpose is BST sometimes given to cattle?

- Produce larger cows capable of avoiding dystocia
- Prevent milk fever in dairy cattle
- Increase the rate of growth in feedlot cattle
- Produce twinning in dairy cows
- Promote milk production

Explanation - BST or rBST is given by injection to lactating dairy cows every two weeks to **increase the amount of milk produced and to prolong lactation**.

Question

Which of the following medications has the shortest meat withdrawal time in beef cattle?

- Penicillin G
- Sulfadimethoxine
- Chloramphenicol
- Ceftiofur
- Oxytetracycline

Explanation - The correct answer is **ceftiofur**. Ceftiofur or Naxcel has a **4 day** withdrawal time in meat. Chloramphenicol use is not allowed in food animals. Oxytetracycline (LA200) has a **28 day** meat withdrawal time. Sulfadimethoxine has a meat withdrawal time of **7 days**. Penicillin G has a meat withdrawal time of **10 days**.

Question

You are performing a post-mortem examination on a cow that died of unknown causes. On exam, you find that the liver is enlarged, diffusely lighter yellow in color than usual, and is easily friable. You put a section into formalin and it floats. Which of the following best describes the likely pathogenesis?

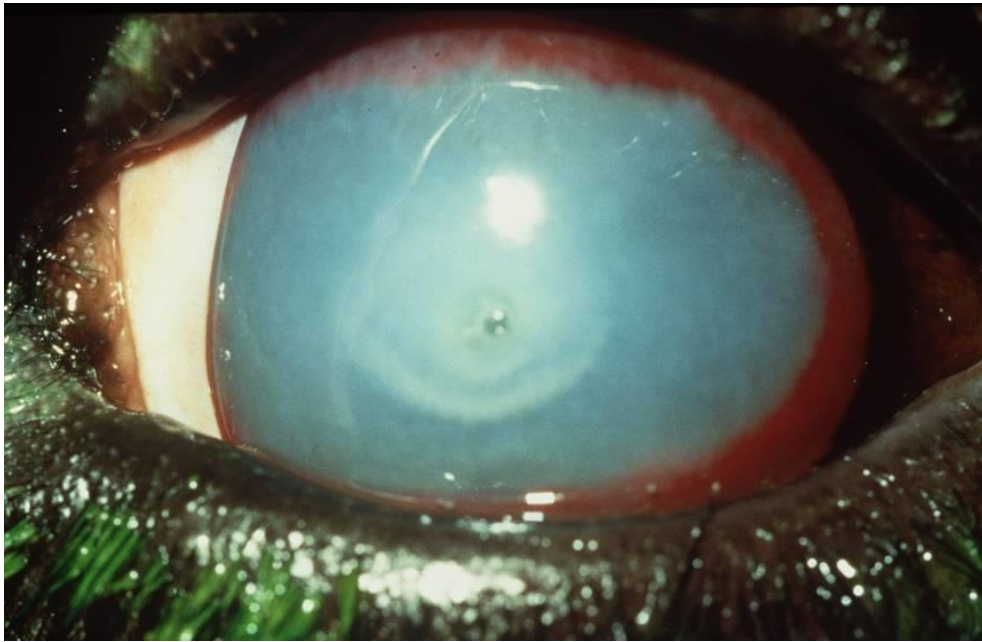
- Chronic active hepatitis
- Lipofuscinosis
- Hepatic lipidosis
- Hepatic lymphoma
- Copper toxicity

Explanation - The best choice is **hepatic lipidosis**. Affected livers usually appear as described in this example due to swelling from lipid vacuoles within the hepatocytes. The section floats in formalin due to decreased density of the lipid vacuoles.

Lipofuscinosis is a storage disease that usually gives the liver a dark appearance. Copper toxicity can cause the liver to appear pale tan or bronze but would not cause the other abnormalities. Chronic active hepatitis will often progress to cirrhosis. Lymphoma could cause the enlarged liver but should not cause the liver to float.

Question

While performing physical exams at a state fair, you notice one of the cows has a central ulcer in her eye as shown in this image. What is your diagnosis?



- Thelazia
- Pinkeye
- Infectious bovine rhinotracheitis
- Bovine viral diarrhea

Explanation - The correct answer is **pinkeye** (infectious bovine keratoconjunctivitis). This image is a typical representation of what you are likely to observe. Usually, initial symptoms are blepharospasm, chemosis, and photophobia. This is due to the centrally located ulcer from the infection. The ulcer usually runs its course over a few weeks, however sometimes you may observe corneal descemetocelles and corneal perforation. Therefore, you will probably want to treat these conditions also. Additionally, it is very painful and stressful for the animals, and they will decrease their productivity.

IBR and Thelazia (eyeworm) can also cause ocular signs.

Question

A valuable bull that has been heavily grain fed for show for over 3 months is found bleeding from the nose. You examine the animal and note a fever of 104 F, rapid respiratory rate, and HR of 90 beats/min. You tell the owner that this bull may have developed rumen acidosis in the past, a resulting liver abscess and has now developed _____.



- Bleeding diathesis due to clotting defect
- Vena caval thrombosis and metastatic pneumonia
- Bovine respiratory syncytial virus pneumonia
- Bloody nose from trauma
- Peracute Mannheimia hemolytica bronchopneumonia

Explanation – The correct answer is **vena caval thrombosis** and metastatic pneumonia. By chance a liver abscess in a few animals that develop rumen acidosis may form near the posterior vena cava and cause infected thrombi to break off and move down pulmonary arteries into the lung until they lodge and form an abscess. Pulmonary embolic abscesses then create tracts from affected arteries to an airway, which results in pulmonary bleeding. This condition is extremely difficult to treat successfully and animals usually die within months of a massive bleed.

Question

Which of the following is not a zoonotic pathogen shed in cow milk?

- Brucella abortus
- Campylobacter fetus ssp venerealis
- Listeria monocytogenes
- Mycobacterium avium ssp paratuberculosis
- Salmonella Dublin

Explanation - The correct answer is **Campylobacter fetus ssp. venerealis**, which is the main cause of bovine campylobacteriosis but is not shed in milk. This organism is an obligate parasite of the bovine genital tract and causes abortion. Infection usually results in **temporary infertility** or **early embryonic death**. A different Campylobacter, **C jejuni**, is an emerging milk zoonotic pathogen.

M avium ssp paratuberculosis is believed by some individuals to be a possible human pathogen , perhaps responsible for some (but not all) cases of **Crohn`s disease**. The majority of evidence would disagree with that position, but agree that it should not be present in milk for human consumption.

Question

You are performing health checks on a beef ranch after an E. coli O157:H7 outbreak was detected due to contaminated crops in a nearby vegetable farm. Which of the following is an appropriate way to identify and test suspected carriers?

- Send a lymph node biopsy to a diagnostic lab for histopathology and immunohistochemistry from cattle with lymphadenopathy
- Send stool to a diagnostic lab for fecal flotation and Baermann examination in cattle that are emaciated or underweight
- Send swab of sputum or respiratory secretions to a diagnostic lab for O157:H7 PCR from cattle that are coughing or showing respiratory distress
- Send stool to diagnostic lab for O157:H7 specific fecal culture from a random sampling of cattle
- Send stool to diagnostic lab for O157:H7 PCR from cattle displaying signs of hematochezia

Explanation – The correct answer is **send stool to diagnostic lab for O157:H7 specific fecal culture from a random sampling of cattle**. E. coli O157:H7 is an enterohemorrhagic strain of E. coli that produces "Shiga-like toxins" which cause illness in humans. The bacteria can exist in the intestines of healthy, normal cattle without causing signs or symptoms; therefore, there are no specific signs to look for when trying to identify suspects.

A stool culture can detect the bacterium, but must be specifically requested. The sample is usually cultured on sorbitol-MacConkey (SMAC) agar. On SMAC agar, O157 colonies appear clear due to their inability (unlike other E. coli serotypes) to ferment sorbitol. Non-sorbitol fermenting colonies are tested for the somatic O157 antigen before being confirmed as E. coli O157. Like all cultures, diagnosis is slow using this method, and swifter diagnosis is possible using PCR techniques.

In humans, common signs of infection are severe, acute hemorrhagic diarrhea and abdominal cramps, usually without fever. In most cases, the illness resolves in 5 to 10 days.

Question

A 3-year-old beef cow presents with 4 days' history of poor appetite and rapid weight loss. The cow had calved 10 days previously and had prolapsed her uterus immediately after delivery of a large dead calf that had been "hip-locked". The cow had received no antibiotics because the uterus was replaced easily and the placenta was already detached from the caruncles. The cow is now weak and depressed. The rectal temperature is 100.8F. The ocular and oral mucous membranes appear slightly congested. The heart rate is 96 beats per minute. The respiratory rate is 30 breaths per minute with a slight abdominal component. The ruminal contractions are reduced and the cow has passed only scant feces. Rectal examination reveals that the uterus is still extending well beyond

the pelvic inlet.

Vaginal examination reveals approximately 200 mL of foul-smelling brown fluid. Despite treatment with intravenous oxytetracycline and flunixin for suspected metritis the cow died suddenly 2 days later. Postmortem examination reveals a septic metritis and the liver lesions shown here. What condition is affecting the liver?



- Fasciola hepatica
- Clostridium chauvei
- Mycobacterium paratuberculosis
- Fusobacterium necrophorum

Explanation - The image shows widespread **severe liver abscesses caused by Fusobacterium necrophorum**. Fusobacterium necrophorum is a gram-negative, obligate anaerobic bacterium that is a component of **normal rumen microflora**. In this case, the metritis caused bacteremic spread of the organism which can go to the liver and release local toxins leading to damage and potential abscess formation. Typical Fusobacterium lesions are yellow and spherical with irregular outlines. A diagnosis could be confirmed in this case by culture of the uterine contents and liver. Affected livers are condemned at slaughter. Adhesions to surrounding organs or the diaphragm may require carcass trimming. Liver abscess can also lead to disease associated with thrombosis of the vena cava.

The utility of prophylactic antibiotic therapy in large animal practice is unclear and this practice is often questioned with respect to cost, food safety (milk and meat withdrawal periods), and selection for antibiotic resistance in certain bacterial species. However, in this particular case, prophylactic antibiotics after replacement of the uterine prolapse may have prevented/cleared the uterine infection and/or prevented the bacteremia seeding the liver with fatal consequences.

Fasciola hepatica is the liver fluke of cattle. While Fasciola can cause liver lesions, the lesions

typically appear more as tracks and/or hemorrhage. Animals with fasciolosis typically present with abdominal pain or jaundice acutely. Chronically, animals become anemic or anorectic.

Clostridium chauvei is the cause of blackleg in cattle and sheep and causes lameness and fever.

Mycobacterium paratuberculosis is the cause of Johne's Disease which results in chronic wasting.

Question

There are a number of drugs that are used extra label in beef cattle. When working with any food animal, you always have to consider milk and meat withdrawal. What is the meat withdrawal (in days) for xylazine, tolazoline, lidocaine, and meloxicam, respectively?

- 15, 1, 8, 4
- 4, 8, 1, 15
- 7, 18, 21, 15
- 4, 1, 18, 21

Explanation - The correct answer is 4, 8, 1, and 15. Remember that xylazine is extremely potent in cattle. Taking 10% of the dose that would be given to a horse of equivalent size is sufficient (0.5 - 1.0cc).

Tolazoline is an alpha 2 antagonist. Give the same volume as xylazine. Lidocaine is commonly used during c-sections in cattle. If a producer is doing a c-section as a salvage procedure, it is important to inform that person that the cow cannot go to slaughter for 24 hours.

Meloxicam is being used more and more. It is longer acting (~ 4 days) than banamine, but banamine only has 4 days of meat withdrawal. If you plan on going into production medicine, it is important to memorize the numbers for these commonly used drugs so that you can inform the producer.

Question

You perform a somatic cell count (SCC) on a string of cows that are down in milk production. Their count ranged from 100,000 to 200,000 cells/ml. What is your interpretation?

- SCC is below normal
- SCC is moderately elevated
- SCC is severely elevated
- SCC is normal

Explanation - The correct answer is the somatic cell count is **normal**. The problem that is causing the decreased milk production does not appear to be associated with mammary gland infection.

Many studies suggest that cows with **SCC of less than 200,000 are not likely to be infected with major mastitis pathogens**, but cows with SCC above 300,000 are probably infected (Smith, 1996).

Herds with bulk tank SCC above 200,000 have varying degrees of subclinical mastitis. At 500,000

SCC, approximately 16% of the mammary quarters may be infected, resulting in a 6% reduction in milk production compared to a SCC of 200,000.

Question

You are presented with a Holstein bull because he is not eating well. He has a normal temperature, HR=80 and RR=20. There is ventral abdominal edema (see image) and his breath smells like ammonia. Ultrasonography of the abdomen reveals free abdominal fluid and a collapsed urinary bladder.

You suspect a ruptured bladder and urethra with secondary uroperitoneum due to a urolith in the urethra. Which of the following test results on blood are most useful in confirming your diagnosis?
Image courtesy of David Van Metre



- Hyponatremia, hypochloremia, hyperphosphatemia
- Hyponatremia, hypokalemia, hyperchloremia
- Hypernatremia, hyperchloremia, hyperkalemia
- Azotemia, hypophosphatemia, hypernatremia

Explanation – The correct answer is **Hyponatremia, hypochloremia, hyperphosphatemia**. These are the electrolyte abnormalities that should be expected in cases of uroabdomen. There would also be **azotemia** (elevated BUN), and possibly **hyperkalemia** in the blood.

Question

You examine a very ill 4-year old Holstein dairy cow on a large commercial dairy. She freshened one week ago and was producing well, until she was found down and unwilling to rise this morning when you were called. T=103F, HR=90, and RR=35. The scleral vessels are dark and enlarged, her rumen is fairly empty and the motility is poor, and she appears too weak to rise. Rectal exam reveals an involuting uterus which can be retracted, discharging a brownish red mucoid non-odorous lochia through the vagina. The left rear quarter of her udder is swollen, hot, painful, and discolored (see image), and contains a serum-like secretion with clumps of fibrin in it. What is your diagnosis?



- Hypocalcemia (milk fever)
- Grain overload
- Displaced abomasum
- Metritis
- Coliform mastitis

Explanation - This is a case of severe **acute coliform mastitis**, and the absorbed endotoxin (**LPS**) is causing many of the systemic signs observed. The cow needs to be **aggressively treated with IV fluids, NSAIDS, and supportive nursing**. The gland should be frequently milked out. The use of both **intramammary and systemic antimicrobial drugs** to which most coliforms are susceptible is still controversial, but is often done in cows in a severe state of illness as in this case. While this cow may have secondary hypocalcemia, treatment with calcium needs to be approached cautiously, as endotoxic animals have very sensitive myocardium and arrest may occur if calcium is given IV. If given, preferred routes of calcium administration would be **subcutaneous or oral**.

Question

Which of the following is NOT a benefit of providing a DCAD (dietary cation-anion difference) diet to cattle?

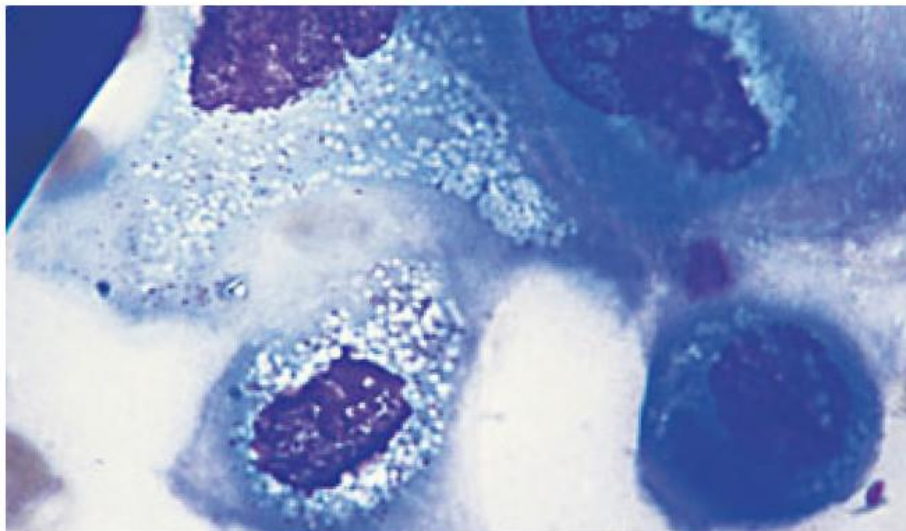
- Cows remain relatively more alkalotic
- There is a lower incidence of milk fever
- Cows absorb calcium more readily
- Parathyroid hormone function is enhanced

Explanation - DCAD is used to help prevent milk fever. Cows eating a DCAD diet are actually **more acidotic** which enhances parathyroid hormone function along with a better ability to utilize dietary calcium. The easy measure is to check urine pH (it should be acid) on cows to be sure they are ingesting the diet.

To review, DCAD is dietary cation-anion difference. A DCAD diet is enhanced with more anionic salts containing the strong ions chloride and sulfur, and has decreased amounts of strong cations such as sodium and potassium.

Question

A 9-year old Friesian cow has swollen eyelids (see image). You examine the cow and note marked blepharospasm and ocular discharge. You perform a fine needle aspirate and a representative slide is shown. Which of the following should you tell the farmer about this cow?

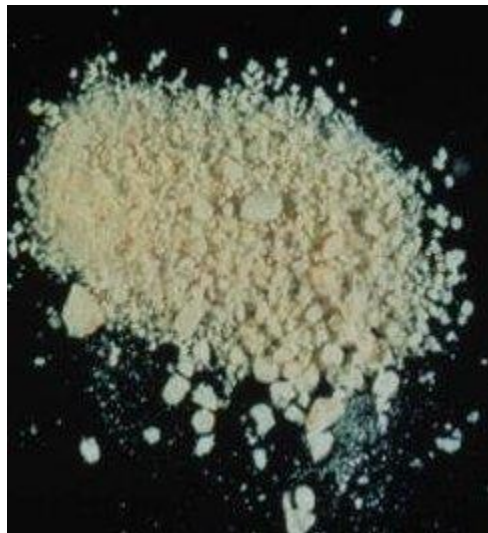


- The cow has lymphosarcoma which may have a viral etiology
- The cow has infectious bovine rhinotracheitis and all cattle should be tested
- The cow has lymphosarcoma and sunlight and pigmentation play a role in development
- The cow has squamous cell carcinoma which is not a clinically or economically important disease
- The cow has squamous cell carcinoma which has a heritable component

Explanation - This is a case of **ocular squamous cell carcinoma** (also known as "**cancer eye**") which is one of the most common neoplasms of cattle and causes significant economic loss due to shortened productive life and condemnation at slaughter. The etiology is multifactorial but is believed to have a **heritable component** as well as association with **sunlight, eyelid pigmentation, and nutrition**. The diagnosis can be made from the clinical presentation and fine needle aspirate showing a **cluster of epithelial cells with anisocytosis and basophilic, vacuolated cytoplasm**.

Question

Which type of urolith occurs most commonly in feedlot cattle receiving large amounts of grain and is shown in the photo below?



- Silicate
- Struvite
- Calcium oxalate
- Calcium carbonate

Explanation - **Struvite** is composed of **calcium, magnesium and phosphate**. The **alkaline urine** in cattle along with **high dietary phosphate** and magnesium levels favors formation of struvite stones.

Silicate stones are primarily found in sheep and cattle grazing western rangelands. Calcium carbonates are most commonly found in sheep grazing pastures high in calcium and oxalates. Calcium oxalate crystals are often present in ruminant urine and may be incorporated in small amounts into other types of stones.

Question

A dairy farmer asks you to perform a post mortem exam on a mature Holstein which died suddenly last night. You find the peritoneal cavity full of rumen contents and a perforated ulcer through a rumen pillar (see photo showing rumen mucosa), as well as other ulcers in the rumen mucosa. Based on these findings, what is the correct diagnosis?



- The ulcer inducing bacteria *Helicobacter pylori*
- Mycotic rumenitis from moldy feed components
- Rumen acidosis with ulceration
- Chronic stress induced ulcers
- Acid reflux from the abomasum into the rumen

Explanation – The correct answer is **rumen acidosis with ulceration**. Feeding high concentrate levels or suddenly changing the amount of concentrate fed can result in a drop in rumen pH below 5.5, ulcers and even perforation. Introducing concentrate slowly and feeding buffers such as sodium bicarbonate can help minimize these problems in high-producing dairy cattle.

Question

You are examining a group of 20 yearling beef heifers in a late summer in Alberta, Canada that has been cooler and wetter than normal. The heifers have been experiencing poor growth and diarrhea. The farmer reports that the cows have developed a frequent, non-productive cough after exertion in the past week. You examine the cows and find their vital parameters to be within normal limits with the exception of several mildly tachypneic cows. There is no ocular or nasal discharge seen. You auscult occasional crackles in many of the cows. Fecal examination reveals *Dictyocaulus viviparus* L3 in three of six samples. You treat the cows with ivermectin and see cessation of coughing and diarrhea within a few days. Which of the following would be the best way to prevent this problem next year now that there is a known risk?

- Control of snails

- Injectable vaccine administered 4 weeks before the grazing season
- Control of earthworms
- Control of ticks
- Persistent use of anthelmintics 2 to 3 times during the grazing season

Explanation - Persistent use of anthelmintics 2 to 3 times during the grazing season. Based on the presentation and diagnostic findings, this is a case of *Dictyocaulus viviparus*, the **bovine lungworm** and cause of **verminous bronchitis**. Although the worm is more common in Europe, cases can be seen worldwide including in North America, particularly when weather conditions permit (**cooler, moist summers**). *Dictyocaulus* often affects younger cattle more severely. Signs include cough and frequently tachypnea. The diagnosis is frequently suggested by the **seasonal incidence** although confirmation with **fecal examination (Baermann)** is important to achieve a definitive diagnosis. Treatment with an anthelmintic of clinically affected animals is usually effective.

Dictyocaulus has a direct life cycle and does not require a snail, earthworm, or tick for transmission. There are 2 main methods of prevention. A strategic anthelmintic program entails administration of an anthelmintic such as ivermectin at 3, 8, and 13 weeks post-turnout. There are approximately 28 days of residual activity against lungworm. Vaccination is used in some areas (mainly Europe) and involves an attenuated oral vaccine of 1,000 irradiated L3 *Dictyocaulus viviparus* at 6 and 2 weeks pre-turnout.

Question

Which of the following is the best treatment for thelazia in cattle as shown in this image?



- Fluconazole
- Piperazine
- Thiabendazole
- Remove manually

Explanation - The correct answer is to **remove them manually**. After removal it is recommended to treat with **10% levamisole drops**. This is actually a photo of thelazia in a canine, but the appearance is very similar in cattle. The eye-worm can also be treated with ivermectin.

Question

A dairy is having difficulties because many of the lactating cows are developing hairy foot warts as seen in the picture (papillomatous digital dermatitis) and are becoming lame. The owner plans to have all cows evaluated and the feet trimmed on those that need it. What other treatment would be effective?



- Ceftiofur SQ for 3 days
- Topical daily spraying of all lesions with oxytetracycline, plus installation of properly designed and managed foot baths.
- Commercial wart vaccine two times SQ at 4 week intervals

- Use of a commercial Treponema vaccine in all cows
- IM procaine penicillin daily for 5 days, plus properly designed and managed foot baths

Explanation - Both **topical tetracycline** and **topical lincomycin** have been found effective against the **Treponema spirochete** that causes this lesion. **Foot baths** can also be effective but difficult to manage on large dairies. A commercial vaccine is likely ineffective based on a published study finding no benefit. Systemic treatments with penicillin or ceftiofur are not recommended as effective, and penicillin use would require discarding the milk. The commercial Treponema vaccine has not been shown to be effective. Ceftiofur may not be used extra label.

Question

The owner of a new beef ranch on poor volcanic soil asks you to evaluate 2 steers. They are representative of an ongoing herd problem of chronic diarrhea and respiratory disease that is unresponsive to antibiotic treatment. On physical exam, you notice achromotrichia, ill thrift, and a temperature of 103F in both steers. You perform a transtracheal wash in one of the steers and it comes back positive for Pasteurella multocida. What is your diagnosis?

- Bovine viral diarrhea
- Copper deficiency
- Selenium deficiency
- Pasteurella pneumonia

Explanation - The correct answer is **copper deficiency**. The giveaway is achromotrichia or loss of hair color. Dilution of the coat color is due to dysfunction of tyrosinase which converts L-tyrosine to melanin. In addition, copper deficient animals will have spontaneous fractures, secondary respiratory disease, diarrhea, ill thrift, decreased immunity, anemia, and poor reproduction. Selenium deficiency and BVD are actually pretty good differentials and if achromotrichia was not present either of those two are reasonable choices. Molybdenum deficiency would not result in achromotrichia. On the other hand, if there had been excess molybdenum, then the Cu:Mo ratio would be off and copper deficiency could be observed.

Question

You are presented with a bull because he is not eating well. He has a normal temperature, HR=80 and RR=20. There is ventral abdominal edema and his breath smells like ammonia. Ultrasonography of the abdomen reveals free abdominal fluid and a collapsed urinary bladder.

You suspect a ruptured bladder and urethra with secondary uroperitoneum due to a urolith in the urethra. You take a percutaneous needle sample of the peritoneal fluid. Which of the following test on the fluid is preferred to best determine whether the fluid sampled is urine?

- Potassium
- Urea nitrogen
- Sodium
- Creatinine

Explanation - Either markedly elevated **fluid creatinine levels** or a **ratio of fluid to serum creatinine greater than 2:1** is indicative that the fluid is urine. Urea and potassium will freely diffuse back into the blood and lymph and may thus be only slightly elevated. Once in the blood, the urea can be recycled in the rumen and destroyed by rumen bacteria.

Question

Guillain-Barre syndrome is an acute inflammatory demyelinating polyneuropathy of humans that has been associated with a foodborne illness. Which of the following agents has been associated with Guillain-Barre syndrome?

- Campylobacter jejuni
- Salmonella
- Clostridium perfringens
- Listeria monocytogenes
- Yersinia enterocolitica

Explanation - Guillain-Barre syndrome appears to be an **autoimmune disease** that is triggered after certain respiratory and gastrointestinal infections. 40% or more cases of the syndrome are seen after **Campylobacter jejuni infections**. Other agents that have been associated with Guillain-Barre syndrome include **cytomegalovirus** and **Epstein-Barr virus**.

Question

You have diagnosed interdigital necrobacillosis (infectious footrot) in a herd of 300 female beef cattle. It is a rainy summer, and the animals have been confined for artificial insemination in muddy conditions. In addition to treating the obviously lame cattle with oxytetracycline, which of the following recommendations should be made to effectively aid in controlling and preventing the spread of this problem?

- Spray the entire pasture with 2% copper sulfate to eradicate the organism
- Vaccinate herd against Dichelobacter nodosus
- Put several tons of crushed stones in one area for the cattle to stand on
- Test all animals and remove Fusobacterium necrophorum carriers
- Either disperse the group or provide a dry area on which to stand

Explanation – The correct answer is to disperse the group or provide a dry area on which to stand. The high density of animals, wet muddy conditions, combined with interdigital trauma from rocks, can be the major culprits. Break that cycle if possible.

Question

You examine a 7-year old dairy cow with the complaint of poor milk production and weight loss. You find a normal TPR, but the cow is in poor body condition compared to others in the string, and has multiple enlarged lymph nodes at widely scattered locations (see image). You suspect bovine

leukosis virus (BLV) has caused clinical lymphoma. Which of the following tests would be the most definitive in making the diagnosis of lymphoma?



- WBC count
- AGID for BLV antibodies
- Lymphocyte count
- ELISA for BLV antibodies
- Aspirate lymph node and make slide

Explanation – The correct answer is **ELISA for BLV antibodies**. A biopsy is definitive if you can demonstrate antigen with immunohistochemistry, but many diagnostic labs do not have this capability so we did not select this answer as correct. Aspiration can lead to false positives, as many inflamed reactive nodes in cattle can have cells that look cancerous. The ELISA for BLV only tells you that the cow has antibodies to BLV virus and is infected, but not that she has clinical lymphoma. However if she had multiple enlarged nodes and is BLV antibody positive, I would feel confident saying she has lymphoma. A negative ELISA would rule out BLV however. The AGID is less sensitive than ELISA. The WBC count and lymphocyte count lacks sensitivity and specificity.

Question

Nine out of 100 adult cattle are found weak, depressed, and staring into space. On physical exam, they are found to be pale, icteric, and febrile. None of them have hemoglobinuria. The nine cattle all arrived at the ranch approximately one month ago. What is your most likely diagnosis?

- Anaplasmosis
- Anthrax
- Bacillary hemoglobinuria
- Leptospirosis

Explanation - The correct answer is Anaplasmosis. The causative agent is *Anaplasma marginale*. The clinical signs are fairly straight forward, and you need to pick up on a couple key features. The fact that **new adults are sick is one feature because cattle are resistant to clinical Anaplasmosis as calves**. Also, it should be remembered that hemoglobinuria with Anaplasmosis is never seen because it is all extravascular hemolysis. Since there is no hemoglobinuria, **leptospirosis, bacillary hemoglobinuria, and anthrax** can be ruled out. Additionally, **icterus with anthrax is not seen**.

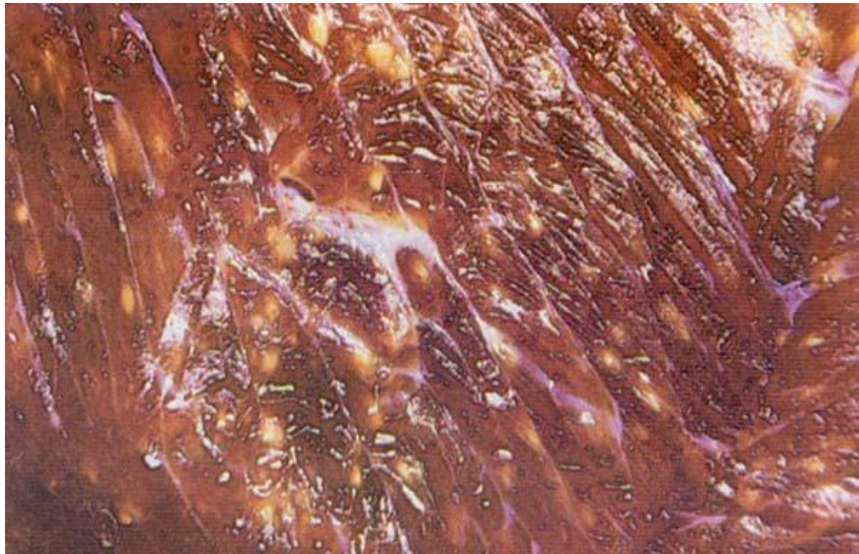
Question

What is the definitive host of *Sarcocystis cruzi*?

- Sheep
- Horse
- Goat
- Dog
- Cat

Explanation - The correct answer is **dog**. The ruminant is an intermediate host. ***Sarcocystis hirsuta*** involves the **cat** as the definitive host. Primates are the definitive host for *Sarcocystis hominis*. The life cycle involves a carnivore eating an infected cow which has cysts in the muscle. Then the cyst eventually forms sporocysts which are shed in feces and subsequently eaten by more cows. The sporocysts then hatch and penetrate artery walls and hang out in the endothelium to develop into sporozoites and eventually become merozoites at which time they invade muscle and encyst as sarcocysts. It takes about 10 weeks for the entire maturation process to occur. Clinical signs are non-specific such as fever, anorexia, salivation, weakness, muscle fasciculations, and weight loss. Diagnosis is likely to be at necropsy; so, prevent carnivore feces from contaminating the area. The definitive host of *Sarcocystis hirsuta* is the cat and for *Sarcocystis hominis*, it is the human.

<i>Sarcocystis</i> spp. in Cattle			
Species	Definitive Host/s	Size of cyst	Pathogenicity
<i>S. cruzi</i>	Dog, coyote, red fox, and wolf	Microscopic, less than 0.5mm long.	Most pathogenic species in cattle it can cause fever, anaemia, abortion neurologic signs and even death.
<i>S. hirsuta</i>	Cat	Macroscopic, 8mm x 1mm, fusiform in shape	Mildly pathogenic
<i>S. hominis</i>	Humans and some primates	Microscopic	Mildly pathogenic to cattle



Sarcocystosis Eosinophilic Myositis
