

Question

A 10-day old commercial dairy calf has diarrhea that is white in color (see photo). The calf is dehydrated, hypovolemic, weak and unable to stand. T=100F, HR=100, and RR=20. No other abnormalities are found on physical examination. Based on these findings, what is the treatment of choice?



- Oral fluids containing high levels of both sodium and chloride
- Oral fluids containing sodium bicarbonate
- IV fluids with added sodium bicarbonate
- IV fluids containing only saline
- IV fluids containing 50 meq/L of potassium

Explanation - This calf is typical of those suffering from **nonspecific calf diarrhea**, most often associated with **enteropathogenic E coli, rotavirus, or cryptosporidium**. The calf develops hypovolemia and metabolic acidosis and requires **sodium-containing IV fluids** which contain additional alkali such as sodium bicarbonate. One can assess that the calf is severely acidotic given that it is **lethargic and unable to stand**. While oral fluids may also be useful, at this stage, the calf will require IV fluids.

Question

You are called out to see a 2-month old beef calf that collapsed this morning (see image). The farmer reports that the calf appeared well-nourished and was doing well a couple of days ago. You examine the calf and find temperature 100.6 F, pulse 120 bpm, and respiratory rate 32 bpm with a slight expiratory grunt. The calf's eyes are sunken and the cow is 7-10% dehydrated based on decreased skin turgor. The ocular and oral

mucous membranes appear congested. The abdomen is distended and palpation elicits a painful grunt. A quick field ultrasound shows several liters of peritoneal fluid and abdominocentesis yields blood tinged fluid. You quickly prepare the calf for a midline exploratory laparotomy and you identify a single, focal 1.5 cm perforating abomasal ulcer. With appropriate surgical and medical intervention, what is the calf's prognosis?



- Guarded (20-40% chance of survival and recovery)
- Good (80-90% chance of survival and recovery)
- Fair (50-70% chance of survival and recovery)
- Grave (<10% chance of survival and recovery)

Explanation - This calf has an abomasal perforation and acute septic peritonitis based on the description. The prognosis is grave, even with prompt veterinary attention. The calf's signs of dehydration, weakness, and expiratory grunt are additional poor prognostic indicators. Very few animals recover from diffuse peritonitis and those that do will have massive abdominal adhesions. Acute abomasal perforation through a single 1-2 cm ulcer occurs sporadically in young (2-4 month old) beef calves and the cause is unknown.

Question

You are hired by the potential buyer to examine a valuable 3-month old calf for purchase as part of a pre-purchase examination. You note that the calf appears healthy other than having a temperature of 103F and having some small raised lesions in the mouth around the gums of the incisors and on the dental pad, as shown in the photo. You suggest some lab tests and another exam in three weeks, and tell the buyer that you think the calf most likely has _____.



- Contagious ecthyma
- Foot-and-Mouth disease
- Bovine papular stomatitis (BPS)
- Bovine viral diarrhea (BVD)
- Pseudocowpox

Explanation - BPS is one of two parapox viruses that affect cattle; the other is pseudocowpox. The third parapoxvirus is contagious ecthyma of sheep and goats. Humans can get all three. BPS is a common and usually mild "calfhood" disease, often unnoticed, but it has caused significant mortality in some groups of calves (perhaps due to some immunosuppression). The best course of action is to isolate this calf and rule out BVD by testing for it, then wait to see if the calf recovers in about three weeks. The raised lesions, and lack of other oral lesions, and lack of GI signs tend to make BPS more likely here than BVD.

Question

A 6-month old feedlot steer, which entered the feedlot 4 weeks ago, has lost weight and is now showing an enlarged left flank as shown in the image below. On exam, you find the left side of the abdomen to be gas-filled under moderate pressure, and the rumen to be otherwise poorly filled and with poor motility. Based on percussion and auscultation, the animal also appears to have chronic bronchopneumonia. What is the most likely cause of the rumen malfunction?



- Type 3 vagal indigestion
- Left displaced abomasum
- Frothy bloat
- Free gas bloat, failure to eructate

Explanation - This is sometimes called **Type 1 vagal indigestion, or free gas bloat**. It is frequently associated with swollen mediastinal lymph nodes caused by pneumonia. The signals to or from dorsal rumen receptors, which detect gas pressure and open the cardia, are compromised such that eructation does not occur normally and free gas bloat occurs. This in turn causes the calf to feel full and it eats poorly and loses weight. One needs to treat the pneumonia and perhaps create a temporary rumen fistula to allow the escape of gas until eructation returns to normal.

Question

What is the most common congenital abnormality associated with fetal infection with bovine viral diarrhea?

- Arthrogryposis
- Cerebellar hypoplasia
- Shortened long bones

Explanation - The correct answer is cerebellar hypoplasia. Microphthalmia and hydranencephaly are also lesions observed with fetal BVD infection, however not as common. Renal dysmaturia is not seen with fetal BVD infection. There are two types of BVD (Type 1 and Type 2) with different surface proteins. BVD virus is also classified as being cytopathic or noncytopathic, based on their behavior in cell culture, but both can cause illness. Interestingly, carrier cattle have been infected with the noncytopathic biotype of BVD as a fetus.

Question

The 5-month old calf in the picture has diarrhea, fever and oral ulcers mainly on the dental pad. The calf entered a feedlot about 2 weeks before. Based on these clinical signs and history, the most likely diagnosis is _____.



- Bovine viral diarrhea (BVD)
- Contagious ecthyma
- Infectious bovine rhinotracheitis (IBR)
- Vesicular stomatitis

Explanation - BVD typically causes clinical illness in young susceptible animals exposed and stressed through transport or crowding and can result in oral ulcerations.

Question

Several 6-month old calves in a herd have been losing weight and showing signs of diarrhea. As part of your work up to diagnose the problem in the herd, you perform a McMaster fecal egg count. Which of the following is an appropriate minimum egg count at which you should plan to deworm the calves to promote weight gain?

- 100 eggs per gram of feces
- 300 eggs per gram of feces
- 20 eggs per gram of feces
- 700 eggs per gram of feces

Explanation - Once you see an egg count between **300-400 per gram**, with or without compatible clinical signs, you should consider deworming. That is the level at which weight gains in growing calves will begin to be affected.

Question

You are treating a very valuable 15-day old calf with total parenteral nutrition (TPN) because it had very severe diarrhea, weight loss, and anorexia (see image). You have already added glucose and amino acids to the TPN mixture. What other component must be added?



- Low-density lipoproteins
- Lipids
- Lactose
- Vitamins
- Sucrose

Explanation - A typical TPN mixture for a calf this size would be 1L of 10% amino acids, 1L of 50% glucose and 500 ml of 10% lipids per day.

Question

A feedlot asks you to examine a 6-month old steer calf that is showing bloat. He has been in the feedlot for 2 weeks, is not gaining weight, and is still on a transition ration. He is the only animal in the pen affected. You find he has T=104 F, HR=96, RR=38, and the cranioventral lungs sound harsh with wheezing on both inspiration and expiration. The areas are also consolidated on percussion. The rumen contains gas which disappears when you pass a stomach tube, but the rumen has very poor motility. What is your diagnosis?



- Type 2 vagal indigestion (failure of omasal transport)
- Type 1 vagal indigestion (free gas bloat)
- Type 3 vagal indigestion (failure of pyloric outflow)
- Frothy bloat
- Left displaced abomasum

Explanation - Free gas bloat in young animals is often secondary to bacterial bronchopneumonia, and mediastinal lymph node inflammation that affects the thoracic vagus nerve. Once the gas accumulates, it stops motility and decreases appetite. Treat the pneumonia with antimicrobials. The gas can also be relieved by creating a small temporary rumen fistula.

Question

A group of 3-4 month old dairy calves have oral ulcers and appear reluctant to eat hay because their mouths are sore. You examine 3 affected calves and find that they are of normal size and weight, have normal feces and normal TPR, but have ulcers around the dental pad and gums. The poor quality alfalfa hay contains some grass as shown in the photo. Based on these findings, what is the correct diagnosis?



- Bluetongue
- Actinobacillosis
- Bovine virus diarrhea
- Bristle grass (*Setaria lutescens*) irritation

Explanation - Yellow bristle grass contains sharp miniature barbs that stick into the mucosa of young cattle and horses and cause ulcers. Simple removal from the diet results in healing.

Question

A 7-day old calf presents for further evaluation and supportive care due to an acute onset of watery diarrhea. On physical examination, the calf is markedly depressed, floppy, nonresponsive, and 10% dehydrated. Which of the following best describes this calf's state?

- Hypovolemia, metabolic alkalosis with severe hypokalemia
- Normal acid-base status with severe hypocalcemia and sepsis
- Hypovolemia, severe metabolic acidosis with hypokalemia and hypercalcemia
- Metabolic acidosis, severe hyponatremia, hypokalemia and sepsis
- Hypovolemia, severe metabolic acidosis with hyperkalemia and possible sepsis

Explanation - No matter what the causative agent, calves of this age with severe diarrhea develop **hypovolemia, severe metabolic acidosis**, which results in **potassium leaving cells**, and the calf becomes

hyperkalemic (in plasma). The floppy calf is typical of an animal with severe metabolic acidosis (base deficit of 15 meq or more) and may also be hypoglycemic. This calf is also possibly septic, as bacterial translocation across the gut often occurs in very ill calves.

Question

One 3-week old calf in a group of young calves being fed milk replacer has been depressed, growing poorly and appears unthrifty with a rough hair coat. She recently began kicking at her flank, teeth grinding, and vocalizing with an arched back. She has developed white, putty-like feces and is dehydrated. Which of the following is the most likely underlying cause of the problem?

- Congenital rumen stasis
- Intussusception of the small intestine
- Dysfunction of the esophageal groove
- Excessive carbohydrate in the milk replacer

Explanation - This is a typical description of **esophageal groove dysfunction** in a calf resulting in **rumen acidosis**.

To review normal physiology, the esophageal groove (also known as reticular groove) is a specialized part of the ruminant stomach that closes in response to drinking milk, directing it directly to the abomasum. When dysfunctional, milk goes to the rumen where it is fermented by rumen microbes and converted to volatile fatty acids and lactic acid. The resulting rumen acidosis leads to the clinical signs described in this case. For this reason, this phenomenon is sometimes referred to as rumen drinking.

Question

A farmer was shipped ten 2-week old calves several days ago. They seemed initially normal but a few of the calves are now growing poorly and disinterested in eating the milk-replacer. One calf began vocalizing and arching her back and also developed white and sticky feces. She became very dehydrated and died before you arrived at the farm. Necropsy reveals mucosal inflammation of the rumen and parakeratosis of rumen epithelium. You advise the farmer that decreasing stress can reduce the incidence of this problem. Which of the following management aspects should you also carefully review?

- Animal housing program
- Quarantine program
- Vector control program
- Feeding program
- Vaccination program

Explanation - The clinical description and pathologic findings are consistent with **rumen acidosis**, likely secondary to **dysfunction of the esophageal groove** (also known as reticular groove). To review normal

physiology, the esophageal groove is a specialized part of the ruminant stomach that closes in response to drinking milk, guiding it directly to the abomasum. When dysfunctional, milk goes to the rumen where it is fermented by rumen microbes and converted to volatile fatty acids and lactic acid. The resulting rumen acidosis leads to the clinical signs described in this case. For this reason, this phenomenon is sometimes referred to as rumen drinking.

There are a number of predisposing factors to this problem. The major contributors are **stress, irregular feeding, feeding poor quality milk replacer, feeding milk at too cold of a temperature** (should be body temperature), **tube feeding, diarrhea, and bucket drinking**. Of the options in this question, the best choice is to review the feeding program because it involves so many of the predisposing factors.

Question

A beef rancher in Nevada calls you in to see some of his young cattle which have been out on remote new range on which he recently purchased a lease. The range consists of sagebrush and bunch grasses in a dry alkaline environment. The affected calves are 6- to 8- months of age and are small, thin, and poorly muscled. You examine 3 affected calves. On PE you find normal temperatures, but elevated HR (70 to 92) and RR (30 to 36) on a day when the ambient temperature is only 70F. The calves have pale mucous membranes, their hair coat color is washed out and pale (see photo), and the perineum is stained with diarrhea.

The rancher had an analysis of plant material trace minerals done when he purchased the lease and found the following: Sulfur 40 ppm, iron 3.2 ppm, copper 12 ppm, molybdenum 15 ppm and cobalt 0.2 ppm. Based on this analysis and the condition of the calves, what compound should you treat the group with?



- Copper supplement such as copper oxide orally

- Worm all calves with ivermectin
- Iron injections for iron deficiency anemia
- Protein supplement such as cottonseed
- Injections of vitamin B12 for cobalt deficiency

Explanation - This is classical secondary copper deficiency. Primary copper deficiency is caused by an absolute low level of copper in the feed, while secondary copper deficiency is caused by interference of absorption of copper and increased rate of excretion of copper due to the **presence of molybdenum and sulfates** (iron and other metals can also interfere).

A rule of thumb is that **copper levels in feed should be at least five times those of molybdenum** to avoid secondary copper deficiency. Calves may be anemic and grow poorly, and often have diarrhea and a washed out hair coat color (achromotrichia). Low serum copper levels can be indicative of a problem, but the definitive diagnosis relies on liver biopsy to determine liver copper levels, since the liver is the major copper storage site. Treatment is with excess copper, by feeding copper oxide in molasses or salt. Copper can also be delivered by injection or by slow release wires or bolus given orally.

Question

A three-week old Jersey calf presents due to an inability to walk. On physical exam, there are no signs of trauma and it is noted that the hocks will not flex due to continuous gastrocnemius tension. There were no other abnormal physical exam findings. What is your primary differential?

- Septic hocks
- Spastic paresis
- Bilateral gastrocnemius rupture
- Tetanus

Explanation - The correct answer is **spastic paresis** (aka Elso heel). This is a **hereditary** disease which produces a **continuous stiffness of the hocks**. There could be bilateral or unilateral involvement. It is a **recessive** disease; therefore, affected animals **should not be bred**. Treatment involves a **tibial neurectomy** or **gastrocnemius tenectomy**. Given these signals and clinical signs, spastic paresis should be high on your differential list. Sepsis is highly unlikely because there are no other signs of systemic disease. You would see the opposite clinical signs with a gastrocnemius rupture.

Question

A group of 30 housed 4-6 month-old Friesian heifer calves presents with multifocal several-centimeter skin lesions like the ones seen in the image. The lesions are primarily located around the head and neck but are also seen more sparsely in other areas. The lesions are superficial, dry, scaly and do not appear pruritic. The underlying skin is not thickened. The cows are eating and behaving otherwise normally. Which of the following tests will help confirm your presumptive diagnosis?



- Genetic testing
- Microscopic examination of a hair/skin scraping from edge of the lesions
- Measure serum and liver copper levels
- Bacterial culture of the most severe lesions
- Measure serum zinc levels

Explanation - You should be most suspicious of **ringworm** based on the lesion appearance and distribution. **Microscopic examination from the periphery of the lesions is likely to reveal fungal hyphae of Trichophyton spp.** Dermatophyte culture would also be a good option. Ringworm will typically regress over many months without treatment but untreated lesions may present risk of transmission including **zoonotic transmission**. Topical treatments including 4% lime sulfur, 0.5% sodium hypochlorite (1:10 household bleach), 0.5% chlorhexidine, 1% povidone-iodine, natamycin, and enilconazole may be options and likely work best if any crusts are removed prior to application.

Question

A dairyman brings his prize 6-month old bull calf to your clinic because he is not eating all his feed today and has diarrhea. He has just purchased this registered bull calf from a neighboring state, and it was shipped a week ago during some very cold weather. You examine the bull calf and find T=104, HR=90, and RR=35, with poor rumen motility. There are several ulcers on the dental pad, and the diarrhea is foul-smelling and contains flecks of blood. The calf is hemorrhaging from small scleral blood vessels (see photo). You quickly take a blood sample and have your assistant run it to the state diagnostic lab, which calls you less than an hour later to say that the thrombocyte count

is 5000 (100,000-800,000/ul). You tell the owner that the calf appears to have bovine virus diarrhea infection with thrombocytopenia. What should your first line of therapy be if you are to save this calf?



- High doses of IV ceftiofur
- Blood transfusion with fresh whole blood
- Antiviral drug therapy
- IV fluids to treat dehydration
- Immunostimulant drugs IV

Explanation - The **thrombocytopenia** is caused by BVD virus adhering to thrombocytes which are then removed by the RE system. Once the number gets this low, fatal hemorrhage is possible at any moment. Although not usual, this form of BVD has been described. The other forms of therapy may be needed as well. If the calf survives, you will also need to determine whether or not he remains persistently infected with BVD... if he does, he should not be retained.

Question

In January you examine a group of dairy calves which range in age from 2 to 7 months, with a complaint of hair loss and pruritus. The calves are thin and mucous membranes are pale. One has developed bronchopneumonia, and is also febrile and depressed. You do a skin scraping and find the parasite shown in the image, which your technician identifies as *Hematopinus* sp. The CBC shows the calves to be severely anemic. What treatment recommendation should you now make to the dairy owner?

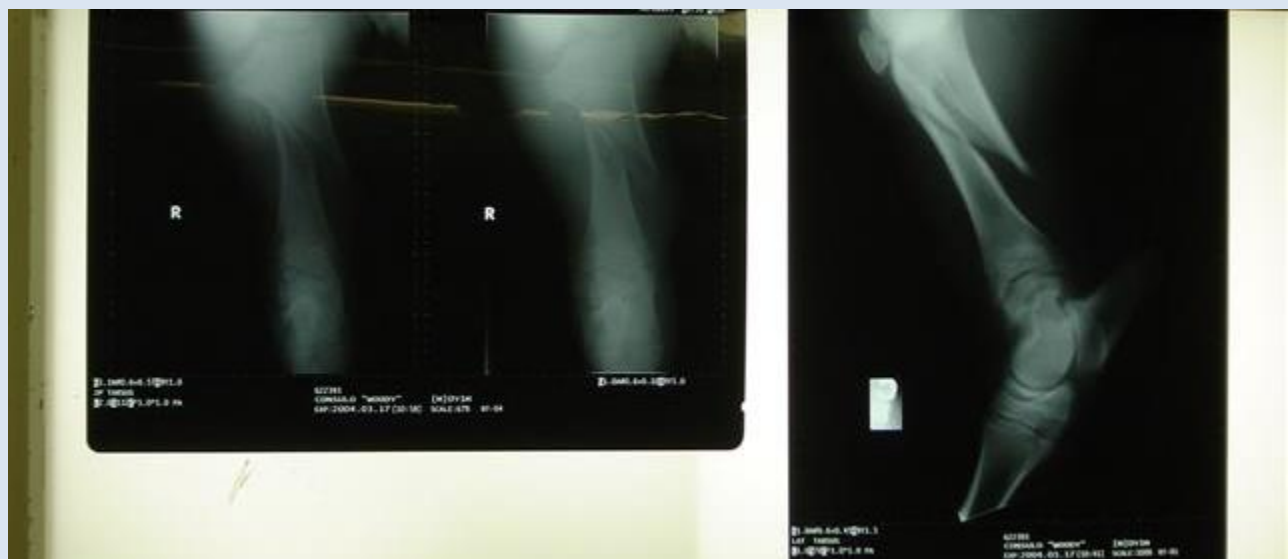


- Vaccinate all calves against Mannheimia hemolytica
- Treat all calves with hematinics
- Treat all calves with long acting tetracycline
- Treat all calves for lice
- Treat all calves for mange

Explanation - This is a blood sucking genus of louse, and can cause severe anemia. The anemic calves become thin and more susceptible to diseases like pneumonia. You can tell this is a louse and not a tick or a mite because lice are insects with 6 legs and ticks and mites are arachnids with 8 legs.

Question

The image shows radiographs from a newborn calf which sustained a fracture during delivery. What is the best nonsurgical method for repair?



- Apply full-length fiberglass cast and Thomas splint
- Apply fiberglass cast from foot to stifle
- Apply Thomas splint from foot to hip
- Apply heavy cotton wraps from the foot to the hip, confine calf in sling
- Put calf in small water bath so that he is barely weight-bearing for 24 hours a day for 6 weeks

Explanation - A calf this age will tolerate a cast and splint well and the bones tend to heal rapidly, usually in **6 to 10 weeks** (even this ugly tibial fracture). The cast must be changed every two to three weeks as the calf is growing rapidly at this stage. The cast can reach from the bottom of the foot up to the stifle. The Thomas splint goes from the pelvis to the foot and minimizes stifle movement.



This is a (very large) example of a Schroeder-Thomas splint, which can be used to facilitate traction/reduction for treatment of fractures distal to the elbow and stifle.

Question

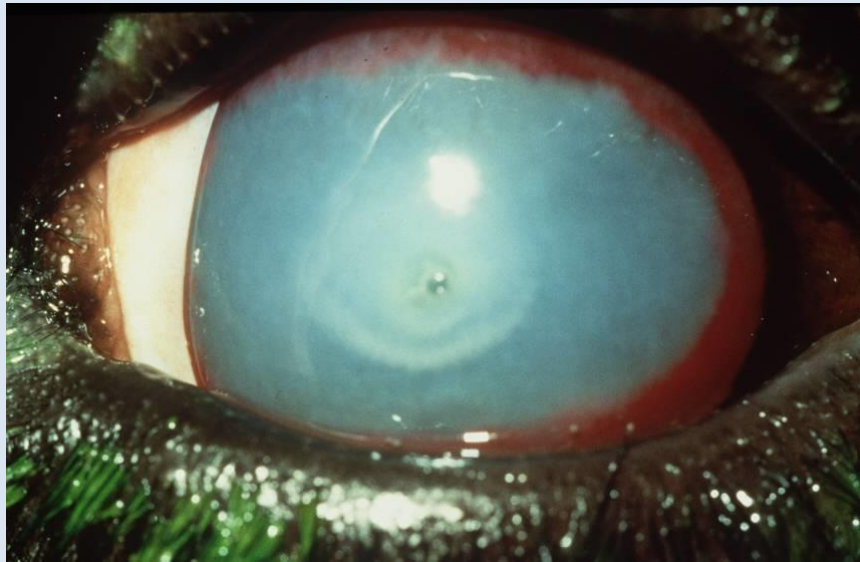
This herd of cattle has been dealing with a *Moraxella bovis* outbreak in calves. In an effort to control the outbreak, it is important to stop the vector from transmitting the disease. Which one of the following is NOT a factor in the transmission of *Moraxella bovis*?

- *Stomoxys calcitrans*
- *Musca autumnalis*
- *Sarcoptes scabiei*
- *Lyperosia irritans*

Explanation - The correct answer is *Sarcoptes scabiei*. Flies are the main vector of *M. bovis*, a.k.a. pink eye. *Stomoxys calcitrans* is the stable fly; *Haematobia irritans* is the horn fly; *Musca autumnalis* is the face fly. The face fly is one of the most commonly implicated vectors of all the flies. *Sarcoptes scabiei* is a reportable mite which induces severe pruritus and, as a result, may be economically devastating, but it is not involved in *Moraxella* transmission.

Question

Which of the following is a causative agent of infectious bovine keratoconjunctivitis as shown in this image?



- *Histophilus somni*
- *E. coli*
- *Moraxella bovis*
- *Thelazia*

Explanation - The correct answer is *Moraxella bovis*. *Thelazia* is the eye worm. *Histophilus somni* is a cause of many syndromes, but is rarely found in the eye. *E. coli* is not an ocular pathogen.

Question

A feedlot operator calls you to perform a postmortem exam on a dead 5-month old calf that was in his feedlot for 3 weeks before it developed diarrhea and died quickly. On postmortem, you find some erosions of the dental pad, ileitis, and a severely ulcerated esophagus (see image). Based on the history and postmortem findings, which of the following is the most likely cause of death in this calf?



- Malignant catarrhal fever
- Mucosal disease
- Bluetongue virus
- Bovine papular stomatitis
- Salmonella typhimurium

Explanation - MD is the severe form of BVD, believed to occur chiefly when an animal born infected with the non-CPE (non cytopathic effect) form of BVD virus is superinfected with CPE biotype of BVD virus, or the virus transforms to the CPE biotype. Severe ulcerations throughout the GI tract can result in death.

Question

The image shows a radiograph of a valuable three-week old dairy calf which is very lame. What is the correct diagnosis?



- Fescue foot
- Arthritis
- Fractured distal third metacarpal
- Osteosarcoma
- Septic arthritis and osteomyelitis

Explanation – The correct answer is septic arthritis and osteomyelitis. The destructive lesions in both joint and bone in an animal this age means infectious process. This needs to be cultured, vigorously lavaged or surgically opened and flushed, followed by aggressive systemic antimicrobial drug therapy with appropriate drugs.

Question

A 5-day old dairy calf has decreased appetite and is depressed. On physical exam, you note that she has a temperature of 104F, HR 120, scleral injection, and one eye has cloudy material in the anterior chamber. Pending lab results, you make a tentative diagnosis of what condition?



- Malignant catarrhal fever (MCF)
- Chlamydia psittaci ocular infection and sepsis
- Pinkeye caused by Moraxella bovis
- Bovine viral diarrhea (BVD)
- Failure of passive transfer (FPT) and sepsis, with hypopyon

Explanation - The history of a neonate with these signs and an elevated temperature, scleral injection and hypopyon are indicative of bacterial sepsis, a result of FPT.

Question

You are presented with a 10-day old dairy calf that is cold (Temperature is 97 degrees) and nonresponsive. His eyes appear sunken as in the photo. In addition to placing the calf on a warming pad, what is the best treatment?



- Gentamicin intravenously at the label dosage
- 4 liters of intravenous fluids containing glucose, sodium, bicarbonate, chloride and lesser amounts of potassium
- 4 liters alkalinizing fluid containing equal amounts of sodium and chloride
- 1 liter of subcutaneous fluids containing glucose, sodium, bicarbonate, chloride and lesser amounts of potassium

Explanation - The calf is in metabolic acidosis and needs sodium containing fluids IV that contain bicarbonate or other base. 4 liters intravenously is a more appropriate fluid volume for a dehydrated 10-day old calf. The sunken eye, as seen in the photo, is an important indicator of marked dehydration.

Question

A 1-month old Charolais calf presents as a result of exercise intolerance and collapse. The only abnormality is elevated AST, CK, and LDH. Selenium and vitamin E levels were submitted for analysis and are normal. CSF collected by lumbosacral puncture is normal. What is your most likely diagnosis?

- White muscle disease
- Tetanus
- Myophosphorylase deficiency
- Brain abscess

Explanation - The correct answer is **myophosphorylase deficiency**. This is a genetic disease that has been identified in Charolais cattle. Affected cattle are born with a deficiency in the enzyme

phosphorylase. Your other main differential would have been white muscle disease, but vitamin E and selenium levels are normal. Tetanus would present differently (rigid paralysis), and a brain abscess is highly unlikely as there are no neurological deficits mentioned.

Question

You examine several dairy calves which have developed areas of hair loss and thick grayish skin (see image). It is winter, and these are 2-month old housed calves. They appear to be otherwise healthy and growing normally, but the owner would like a diagnosis and treatment.



- Warts (papillomatosis)
- Mange
- Lice
- Ringworm
- Lumpy skin disease

Explanation - Ringworm is a dermatomycosis that tends to occur most commonly in housed, crowded calves in winter when there is little UV light present. The most common dermatophyte in cattle tends to be *Trichophyton verrucosum*, with *T. mentagrophytes* second most common. Therapy includes such topical treatments as captan, diluted bleach, lime sulfur, or miconazol shampoos. Systemic treatment is rarely needed.

Question

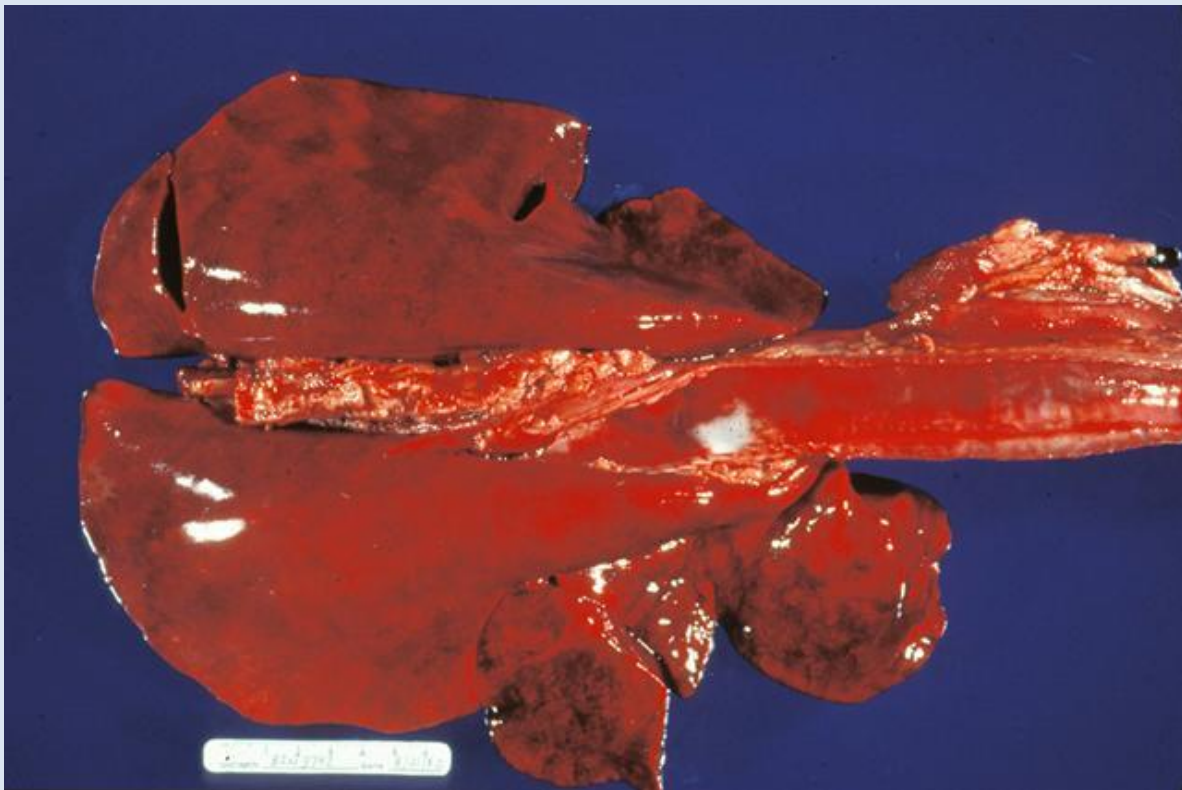
You are working with a farmer who is having trouble with calves between the age of 2 weeks and 6 months. They are alert, but weak, dyspneic and die suddenly. On necropsy they have pale cardiac and skeletal muscles. What is the farmer's problem?

- Selenium deficiency
- Copper deficiency
- Lightning strike
- Sorghum toxicity

Explanation - The correct answer is selenium deficiency. The pale muscle and clinical signs are classic for vitamin E and selenium deficiency. This is important to remember! Other things that should be on your differential list for this case include cardiotoxic plants.

Question

A dairy farmer brings you a 6-week old calf for postmortem exam on a nice warm spring day. He has had three 5- to 7-week old calves die in the last week and this one just died an hour ago. They show **depressed appetite, fever,** and rapid **labored breathing** before collapsing within a day from the time the first signs are noticed. The calves were born on his farm and have been in good well-ventilated individual hutches with shade. They are fed 12% of their body weight per day in whole milk, plus a calf starter grain, alfalfa hay and free choice water. The major lesions are **serosal and subcutaneous petechial hemorrhages** and **heavy wet red lungs** (see image). Based on these pathologic findings, which of the following is the most likely cause of death?

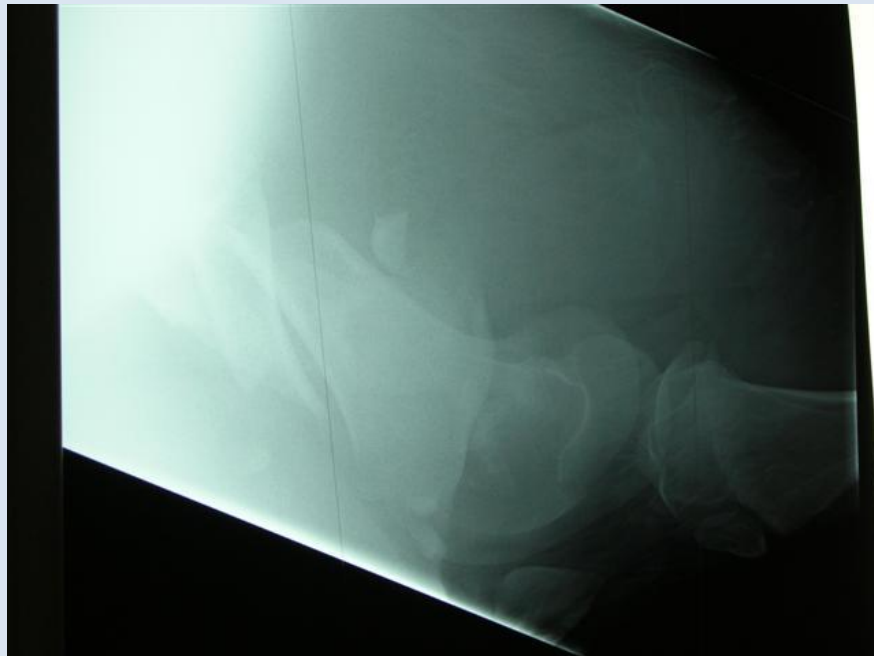


- E. coli septicemia
- Mannheimia hemolytica bronchopneumonia
- Bovine virus diarrhea (BVD)
- Malignant catarrhal fever (MCF)
- Salmonella dublin

Explanation - S. dublin tends to cause septicemia in dairy calves 4 to 8 weeks of age, and the lesions described are typical. The organism can be **transmitted by carrier cows to neonates** at birth or via their milk. The most effective control measures are to **cull carriers** and **vaccinate calves** using a modified live S. dublin vaccine.

Question

The radiograph shows a fracture in a valuable newborn calf. What technique is most likely to be effective in repairing this fracture?



- Intramedullary pin
- Spica splint
- Velpeau sling
- Full length cast
- Screws and cerclage wires

Explanation - The correct answer is screws and cerclage wires. The other alternative is to apply a Schroeder-Thomas splint, but the long-term prognosis is not as good with that procedure.

- Most broken legs in cattle can be repaired economically and with a good prognosis, contrary to what many producers think. Most breaks happen right around calving. Fortunately most producers are more diligent now about pulling. Especially with harder pulls, make sure to double loop the chains. This spreads the force and minimizes the possibility of breaking a leg. The lower the break, on either the front or back legs, the easier it is to repair.
- Breaks below the **hock** or **carpus** are generally **cast**. These days, fiberglass material allows veterinarians to apply a cast that is lightweight, strong and waterproof. Cast material will support the weight of calves right up to mature weight. On larger cattle we use more material, creating a slightly thicker cast. Usually the cast is cut off in three to four weeks and the break is completely healed.
- For breaks higher up the leg, veterinarians often apply **Thomas Schroeder splints**. These are commonly used on **tibial breaks** and less commonly on **radius and ulnar breaks**. Schroeder splints immobilize the joints below and above the break and the calf simply drags the splinted leg until healing has occurred.
- Breaks high on the limbs are rare. That is fortunate, because they are difficult to repair. **Femoral breaks** require **internal fixation** in the form of **pins** and **cerclage wires** or **plates**. These are more costly procedures because anesthetic with surgery is necessary.



Shroeder Thomas splint

Question

A 7 month old Holstein heifer has presented to you with a history of lameness, fever, and respiratory signs including cough, tachypnea and nasal discharge. The owner is concerned because yesterday several more young animals began to exhibit the same signs and one has died. In addition to the signs already noted on PE, you note swollen joints and tenosynovitis in several animals. You perform a post mortem and find the lungs shown in the image, with multiple abscesses full of pus and caseated material. You suspect *Mycoplasma bovis* and submit samples for culture. What treatment should you now select based on this presumptive diagnosis?



- Gentamicin
- Penicillin
- Ampicillin
- Ceftiofur
- Tulathromycin

Explanation - Tulathromycin was approved in the USA for use in treating respiratory disease caused by *M. bovis*. Many isolates of *M. bovis* show resistance to most of the other drugs listed. Since *Mycoplasma* lack a cell wall, drugs that act on the cell wall such as penicillins and cephalosporins are never the best choice. Other possible good choices are tetracyclines or tilmicosin, but many reports of tilmicosin resistance have appeared in the last few years.

Question

A 3-month old Holstein female calf has severe unilateral corneal ulceration, opacity and melting, along with mild conjunctivitis and marked neovascularization. The calf also exhibits photophobia, blepharospasm, and lacrimation. What is the most likely cause of this?

- *Histophilus somni* (formerly *Haemophilus somnus*)
- Bluetongue virus
- Infectious bovine keratoconjunctivitis (IBK)

- *Colesiota (Rickettsia) conjunctivae*
- *Chlamydophila pecorum*

Explanation - The most common bacteria causing this is *Moraxella bovis*, although other organisms including *Neisseria* species and *Moraxella ovis* can also induce similar lesions in cattle. Also, IBR and mycoplasma seem to be risk factors that may increase the risk of developing IBK.

Question

A valuable 14-day old Holstein dairy calf has had diarrhea and the owner has treated it for several days with oral electrolytes and withheld milk. Today it has some CNS signs, and you have been asked to examine and treat the calf. You take a serum sample and measure electrolytes, finding the serum sodium at 180 mEq/L (136-144 mEq/L). What should you now do for treatment?

- Slowly correct the sodium using IV fluids
- Allow the calf access to free water and let it drink
- Give diuretics to drive out the sodium
- Offer small amounts of milk to the calf
- Give the calf 100 ml 7% hypertonic saline IV

Explanation – The correct answer is slowly correct the sodium using IV fluids. Start with a slightly hypertonic IV fluid with a sodium level of 160-170 meq/L and slowly correct the sodium over several days, gradually moving to normal sodium containing fluids like Ringers. Start on milk and offer oral water only after the correction is well under way. With this history, it is highly likely that the calf's brain sodium is also 180 meq/L; if given too much free water too rapidly, the water will enter the brain and cause swelling and death.

Question

A beef ranch has suffered 12 acute deaths of 2-4 month old calves in the past six months. The owner of the ranch states that the animals appeared severely weak and depressed just before dying. On some of them, he noticed that they were having trouble breathing and had a frothy nasal discharge.

You perform a necropsy on a calf that died yesterday. Findings included bilaterally symmetric muscular atrophy. The skeletal muscle appears pale and dry in appearance with white streaks running along muscle bundles. You also notice that there are several calves in the ranch which are having trouble rising, and their musculature appears swollen, hard, and painful. What is the most likely diagnosis?

- Vitamin E and selenium deficiency
- Gossypol toxicity
- Oleander toxicity
- Clostridial myositis
- Septicemia

Explanation - The correct answer is vitamin E and selenium deficiency (white muscle disease). The clinical signs are somewhat compatible with the other answers; however the necropsy results are diagnostic for white muscle disease. There is both a cardiac form, in which animals die acutely, and a skeletal muscle form, in which animals don't die acutely but show clinical signs. In this particular question, the ranch was suffering from both forms. Remember that oleander and gossypol are both cardiotoxic and can cause acute death. Given the necropsy findings, clostridial myositis would be unlikely. Selenium is essential for glutathione peroxidase, deiodinase, and selenoprotein-P to work. Glutathione peroxidase breaks hydrogen peroxide and lipoperoxide into water or harmless alcohols.

Question

Nervous coccidiosis is a disease of cattle of what age?

- Less than 1 month of age
- Less than 1 year of age
- Between 12-24 months of age
- Greater than 24 months of age

Explanation - The correct answer is nervous coccidiosis is a disease of cattle **less than one year of age**. This disease is caused by an enteric infection of *Eimeria* spp. It is thought that the coccidian produces a neurotoxin which results in the neurologic form of the disease.

Question

A rancher has several yearling cattle which were shipped to his place a few days ago and are showing ataxia (see photo). You observe three to be coughing and breathing hard, to have marked gait abnormalities including staggering, circumducting, knuckling, and one has a slight head tilt. All three have fevers of 104 to 105.5 F and appear slightly depressed. They have no rumen motility. One has hypopyon and one has hyphema. Based on the CNS signs you take CSF samples from the 3 in a squeeze chute and find xanthochromia, increased protein, and an increased number of neutrophils. What is your diagnosis?

- Polioencephalomalacia
- *Histophilus somni* (*Hemophilus somnus*)
- Listeriosis
- Rabies
- Lead poisoning

Explanation - Also known as **thromboembolic meningoencephalitis (TEME)** and caused by ***Histophilus somni***, this systemic infection may start in the **respiratory tract in young stressed, often transported, cattle**. Early treatment with antimicrobial drugs such as tetracycline, penicillin, erythromycin, or sulfonamides can be effective.

Question

A 3-week old Holstein calf was born unable to bear weight on its pelvic limbs and was often observed dog-sitting. Now, 3 weeks old, the calf is unable to bear weight on the right hindleg (see image). Radiographs show no bony abnormalities. Which of the following would likely prevent this problem in the future?



- Supplement cows with thiamine
- Remove all lupine from the pasture
- Delivery by Cesarean section
- Vaccinate cows against bovine viral diarrhea virus

Explanation - The description and appearance are most consistent with **femoral nerve paralysis**. This typically occurs due to excessive traction of oversized calves in anterior longitudinal presentation during calving. Rotation of the calf by 45 degrees into a diagonal orientation to align the widest dimension of the calf's hips with the widest dimension of the maternal pelvis may assist delivery in some cases. This problem could have been avoided by **Caesarean**.

The femoral nerve supplies the **quadriceps femoris** muscle and injury results in rapid and severe atrophy and the **inability to extend the stifle joint and bear weight on that leg**. Bilateral femoral paralysis results in the inability to stand. Fractures of long bones following dystocia are rare but can occur. Such fractures can be detected by careful clinical examination and radiography.

Question

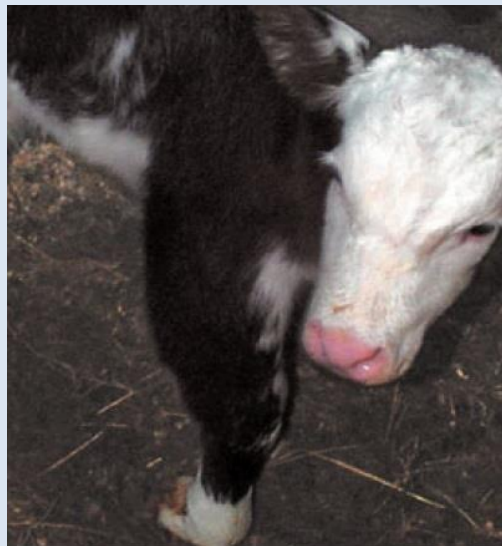
A 3 week old Holstein calf presents for diarrhea, fever, and anorexia. On physical exam the calf appears to have a very stiff neck and hyperesthesia. Blood work shows an increased WBC and neutrophilia. A CSF tap is performed which shows a turbid fluid, protein of 120 mg/dl, and 420 WBCs/uL which are mainly neutrophils. What is the most likely diagnosis?

- Salt poisoning
- Meningitis
- Listeriosis
- Polioencephalomalacia

Explanation - The correct answer is **meningitis**. This conclusion can be made by examining the CSF. An **elevated CSF protein and CSF neutrophilia** indicates a bacterial infection. Listeriosis tends to be associated with **monocytosis** of the CSF. The clinical signs and blood work are non-specific, and only the CSF results allow good differentiation between the other answer choices. With polioencephalomalacia the CSF changes in WBC count and protein will be much lower (5-50 WBCs/uL and protein slightly greater than 50mg/dl). Salt poisoning will not change the CSF protein and WBC count by much either.

Question

A 4-day old bull calf has been unable to bear weight on the right forelimb since birth which was an assisted delivery in anterior presentation using a calving aid. There is loss of muscle tone and markedly reduced reflexes in the right foreleg (see image). The right foreleg is non-painful on palpation. The left foreleg and the hindlimbs are weight bearing with normal reflexes. What should you tell the farmer?



- The calf appears to have a radius fracture from traction at birth and is likely to improve with splinting of the distal limb
- The calf appears to have a fracture of the distal third metacarpal growth plate due to traction at birth and has an excellent prognosis to improve with supportive care
- The calf appears to have right sided radial nerve paralysis due to traction at birth and prognosis for recovery is grave; the calf should be euthanized
- The calf appears to have a right brachial plexus avulsion due to traction at birth and it is unknown whether it will improve with time

Explanation – The correct answer is **right brachial plexus avulsion**. The most likely conditions to consider for this calf are **brachial plexus avulsion** and **radial nerve paralysis** due to traction at birth. This injury results in an inability to extend the elbow, carpus and fetlock and bear weight on the affected limb with loss of muscle over the shoulder with resultant prominent spine of the shoulder blade. There is a dropped elbow, scuffing of the hooves as the leg is moved forward, and the foot is knuckled over at rest. Depending on the severity of injury, **many calves can recover with supportive care**. It is often recommended to carefully splint the distal limb to prevent contraction of the flexor tendons.

Other differentials could include spinal cord trauma or congenital sarcocystosis. Fractures are less likely given the presentation and lack of pain on palpation.

Question

The image shows a polled Hereford calf several months of age with constant hypertonia of extensors of the rear limbs when it stands. It also has difficulty getting up. The condition started over a month ago and is worsening gradually. What is the diagnosis?



- Spastic paresis
- Spinal lymphosarcoma
- Ankylosing spondylitis
- Bilateral ruptured cranial cruciate ligaments

Explanation - Spastic paresis, also known as Elso heel, affects cattle of many breeds (as well as pygmy goats) beginning from three weeks to 1 year of age. It is believed to be caused by a combination of **genetic** and **environmental** factors which somehow cause over stimulation of the gamma motor neurons of the spinal cord.

A second disease, **inherited periodic spasticity** is a genetic disorder (probably single autosomal recessive) of most dairy breeds, and is seen rarely in beef breeds. It first appears at 3 to 7 years of age and gradually worsens, when the animals develop marked muscular spasms of the hip and upper leg muscles.

Question

A 4 month old Holstein calf presents with a right sided head tilt, a unilateral right ear droop, right eye ptosis and epiphora of the right eye. Otherwise, the calf is bright and alert. The owner mentioned that the calf suffered from a respiratory infection the previous week. What is the most likely diagnosis?

- Congenital brain tumor
- Polioencephalomalacia
- Otitis media-externa
- Otobius megnini

Explanation - *Mycoplasma* is a common cause of *otitis media-externa*. Usually, the infection is a result of consuming *contaminated milk*. A congenital brain tumor is highly unlikely. Otobius (soft tick with predilection for ears) is unlikely because the clinical signs are not consistent; however, it is a good differential. With Otobius the calf would probably not show such extreme clinical signs and would probably be scratching and rubbing at the ear. Polioencephalomalacia is more likely to present with stargazing, head pressing, depression, and blindness. Polioencephalomalacia is caused by a thiamine deficiency. An excellent differential for the clinical signs described would be *listeriosis* and *TEME*.

Question

A 6-month old calf presents with a head tilt towards the right side and spontaneous horizontal nystagmus with the fast phase directed towards the left side. Ventral strabismus (eye drop) is present on the right side. There is drooping of the right upper eyelid and drooping of the right ear (see image). Which of the following is the best list of differential diagnoses?



- Otitis media/interna, middle ear trauma, listeriosis

- Polioencephalomalacia, congenital brain tumor, thromboembolic meningoencephalitis
- Rabies, pseudorabies, cerebellar hypoplasia
- Bluetongue, bovine viral diarrhea virus, bovine spongiform encephalopathy

Explanation - The calf's signs are most consistent with dysfunction of the **peripheral vestibular system** (although one cannot rule out central vestibular) and facial nerve dysfunction. **Middle/inner ear infection or trauma** are likely and **listeria** is a reasonable differential as well. Most of the other choices listed are not typically associated with vestibular signs as described in this case.

Question

You are asked to examine a pen of very young dairy calves (4 to 8 weeks of age) with the complaints of aural discharges, head tilts (see image), and ataxia. You also find one with facial paralysis and another with unilateral nystagmus as you examine them. The affected ones have fevers of 103 to 105F. What organism is most likely to be causing these signs?



- Mannheimia hemolytica
- Mycoplasma bovis
- Salmonella dublin
- Histophilus somni
- E. coli

Explanation - *M. bovis* may be spread to young calves via milk. In very young dairy calves it can cause otitis media with aural discharge, head tilt, nystagmus, ataxia, and even facial nerve paralysis. It also causes respiratory disease and can cause arthritis and tenosynovitis in older calves. Mastitis, abortion and other signs can also be caused by *M. bovis*.

Question

The 3 1/2 month old calf in the picture presents with one week duration of diarrhea, hematochezia, and tenesmus. Yesterday, the calf was noted to be extremely depressed, uncoordinated, and was frothing at the mouth. On physical exam, horizontal nystagmus and muscular fasciculations are noted. A fecal egg count performed on a herd mate with diarrhea was performed which yielded approximately 9,000 eggs/g. Given the clinical signs and findings what is the most likely diagnosis?



- Nervous neosporosis
- Nervous Cryptosporidiosis
- Nervous giardiasis
- Nervous coccidiosis

Explanation - The correct answer is nervous coccidiosis. This is caused by a **neurotoxin** produced by **Eimeria** spp. Giardia and Crypto do not cause CNS disease; they are "make believe".

Question

A rancher has called you to diagnose and treat several nursing beef calves in a group which have suddenly developed blindness and dullness. One is down and unable to rise (see photo). Another is vocalizing ceaselessly, and all the affected calves appear dull and unaware of your presence. The affected animals have normal TPR. You pass a stomach tube and wash out some rumen contents, noting an oil sheen on the water in the bucket where the contents have been caught. You then go into the nearby barn and find an open drum half filled with used motor oil. Based on these findings, which of the following conditions do you need to treat these calves for?



- Listeriosis
- Histophilus somni (TEME)
- Lead poisoning
- Rabies
- Malignant catarrhal fever (MCF)

Explanation - Used motor oil contains tetraethyl **lead** when leaded gasoline was used. Cattle are sometimes curious and will actually **drink used motor oil**, resulting in acute lead poisoning. Treatment involves **chelation therapy with calcium disodium EDTA**. Thiamine has also proven useful, as well as several other adjunct therapies. Removal of the oil from the rumen and GI tract may also prove beneficial.

Question

A 4 month old Holstein heifer has a loud cough, tachypnea, diarrhea, and ill thrift of 8 days duration. However, there are no signs of sepsis, depression, or loss of appetite. On physical exam, you could hear crackles and wheezes over the lung fields and a harsh bronchial tone cranioventrally. Given this presentation what is the most likely diagnosis?

- Moldy sweet potato poisoning
- Aspiration pneumonia
- Shipping Fever
- Enzootic pneumonia

Explanation - The correct answer is **enzootic pneumonia**. This disease is **multifactorial** but is mainly a result of poor housing and environment (**poor sanitation and ventilation**). Calves with enzootic pneumonia will have

cranioventral consolidation and many times they have **diarrhea** as a result of being infected with **Eimeria bovis** (like this one).

Shipping fever (fibrinous pleuropneumonia) will most likely present with **more systemic** signs, which is key in differentiating the two diseases.

Aspiration pneumonia will probably not result in diffuse lung pathology without also causing systemic signs.

Moldy sweet potato poisoning is a good differential and will result in respiratory disease followed by death, but there was no history of exposure here. However, these animals will typically present with more acute respiratory distress and **will probably not survive for 8 days**, as death usually ensues 2-5 days after exposure. The principal toxin is **ipomeanol** which is produced by sweet potatoes infected with *Fusarium javanicum* or *F. solani*. Ipomeanol will destroy clara cells and type I pneumocytes.

Question

A 3 week old Guernsey calf presents with fever, anorexia, and depression. The calf had diarrhea and the owner had tube fed it several times a few days ago. On physical exam, you auscultate harsh lung sounds and crackles cranioventrally on both sides of the chest. Which of these is a likely differential?

- Aspiration pneumonia
- Fog fever
- Fibrinous pleuropneumonia
- Pneumothorax

Explanation - The correct answer is **aspiration pneumonia**. **Cranioventral lung disease** is the classical finding with aspiration pneumonia. If you think about it, you realize that if an animal inhales particulate matter, gravity will influence its path and thus there will be cranioventral involvement. Potential causes of aspiration pneumonia in calves include **leaking nipples from milk bottles, mineral oil drenches, pharyngeal paralysis** (due to **white muscle disease**), **gastric reflux, improper intubation**, and **hypoglycemia**.

A pneumothorax results in no audible lung sounds dorsally.

Fibrinous pleuropneumonia (shipping fever) is a good differential, however the clinical signs would be more severe and lung pathology **would be more diffuse**. For example, you will be able to hear crackles and wheezes in all areas, appreciate a soft cough, see nasal discharge, and at times, pleural rubs may be audible if there is pleural effusion or a septic pleuritis.

Fog fever is a respiratory disease of adult cows that results when they suddenly consume lots of lush pasture. At this point, the plants are high in **tryptophan** which is subsequently metabolized in the rumen to **3-methyl indole** (toxic to the lungs).

Question

A 6 month old Brown Swiss presents for respiratory distress of 1 day duration. She has a moist, painful cough and a loud inspiratory stridor. On physical exam, it is noticed that the head and neck are extended, there is a swelling around the larynx, and ozena. She also has a temperature of 104.6F and episcleral injection. On palpation of the larynx, a cough is easily elicited along with pain and increased stridor. What is the most likely organism causing this and diagnosis?

- Arcanobacterium pyogenes, abscess of throat
- Fusobacterium necrophorum, calf diphtheria
- Papilloma virus, Laryngeal warts
- Actinomyces bovis, lumpy jaw

Explanation - The correct answer is **Fusobacterium necrophorum** (aka calf diphtheria or necrotic laryngitis). Clinical signs are seen between **3-18 months of age**. The signs are usually acute, and the animals may die within the week if they are not treated. Actinomyces bovis is the cause of lumpy jaw. Arcanobacterium pyogenes may cause laryngeal abscesses, however affected animals are not febrile and septic. Laryngeal papillomatosis is fairly common in feedlot cattle and is caused by a papovavirus. Clinical signs are usually stertorous respiration and a cough. Again, there are no systemic signs as there are with calf diphtheria.

Question

A dairyman calls to say he has lost several 5 week old calves to acute respiratory signs in the last week. The calves have fever, depressed attitude, decreased appetite, cough and nasal discharge. They do not seem to respond to antibiotic therapy and may die within a few days. On postmortem of one, you find the lungs fail to collapse when the thorax is opened, and they have interstitial emphysema and a rubbery consistency. You believe this is most likely caused by Bovine Respiratory Syncytial Virus (BRSV). What should now be recommended for the herd?

- Intratracheal use of antiviral drugs in all affected calves
- Vaccination of all calves against IBR
- Vaccination of all calves against BRSV
- Metaphyllaxis of all calves from birth with tetracycline IM every 3 days
- Vaccination of all calves against BVD

Explanation - **Vaccination of all calves against BRSV**. Until the calves have time to develop immunity, new animals should be raised apart from and isolated from the current group of calves where the virus is circulating. Treatment of individual calves affected by BRSV may include antimicrobial drugs and NSAIDs; some veterinarians advocate the use of corticosteroids if pulmonary edema is severe.

Question

You are presented with a 6 month old Saler bull which is depressed, off feed, and breathing hard. He was shipped to the new farm 7 days previously. On physical exam, you find T=105F, HR=80,

RR=45, and the scleral vessels are injected and dark. The animal is dyspneic and open-mouth breathing. The cranioventral lung fields auscult abnormally, with harsh inspiratory and expiratory sounds as well as expiratory wheezes. Percussion of the thorax reveals ventral consolidation. Which of the following is the most likely correct diagnosis?

- Mannheimia hemolytica bronchopneumonia
- Atypical interstitial pneumonia
- Dictyocaulus viviparus infestation
- Pneumothorax
- Caudal vena caval thrombosis syndrome

Explanation - These signs are typical of bovine bronchopneumonia caused by Mannheimia hemolytica and associated with shipping fever.

Question

What is the most common respiratory disease of calves 3-8 months of age in the United States?

- Shipping fever
- Aspiration pneumonia
- Fungal pneumonia
- Enzootic pneumonia

Explanation - The correct answer is **enzootic pneumonia**. This disease is **multifactorial** but is mainly a result of **poor housing and environment** (poor sanitation and ventilation). Calves with enzootic pneumonia will have **cranioventral consolidation** and many times they concurrently have **coccidiosis** (Eimeria bovis). This disease can be economically devastating because calves gain weight more slowly and calving is delayed. **Pasteurella multocida** is the most common cause of enzootic pneumonia, however **ammonia, carbon dioxide, hydrogen sulfide, Mycoplasma, Corynebacteria, BVD, BRSV, and PI3**, have all been known to cause the disease.

Aspiration pneumonia is not as common in calves this age. Fungal pneumonia is extremely rare. Shipping fever pneumonia is a respiratory disease of older animals associated with Pasteurella hemolytica and viruses and stress.

Question

This 3 1/2 month old calf presents for weakness and failure to thrive. On physical exam you find normal temperature but rapid heart and respiratory rates. A loud holosystolic murmur is heard on both sides of the thorax with maximal intensity in the region of the tricuspid valve. It is also clearly heard on the left side with maximal intensity near the pulmonic valve (far forward). What is the most likely diagnosis?

- Patent ductus arteriosus
- Traumatic reticulopericarditis

- Ventricular septal defect
- Endocarditis
- Patent foramen ovale

Explanation - The correct answer is **ventricular septal defect**. In order to answer this question, you need to "play the odds" and know that **VSDs are the most common congenital heart defect in cattle**, and they usually present at about **2-3 months of age** because they are failing to thrive and/or are developing pulmonary edema and secondary pneumonia. This defect results in oxygenated blood being pushed back into the right atrium and ventricle. In addition, you will see right ventricular dilation and hypertrophy. The increased flow through the right side creates a relative pulmonic stenosis, and thus the murmur is also heard on the left side in the area of the pulmonic valve. VSD is the most common congenital defect in cattle.

Question

A 12 month old feedlot calf has inspiratory dyspnea, loud inspiratory noises, open mouth breathing, extended head and neck, and a moist painful cough. It is febrile, anorectic and depressed. On palpation of the larynx, the cough appears painful and the dyspnea worsens. What is the condition called?

- Calf diphtheria
- Acute BRSV (bovine respiratory syncytial virus) pneumonia
- 3-MI (3-methyl-indole) induced acute pulmonary edema and emphysema
- Pasteurella multocida bronchopneumonia
- Mannheimia hemolytica bronchopneumonia

Explanation - Also called necrotic laryngitis, or laryngeal necrobacillosis, this mainly feedlot condition strikes randomly but can result in death or a permanently misshapen larynx. The causes appear to be Histophilus somni and Fusobacterium necrophorum.

Question

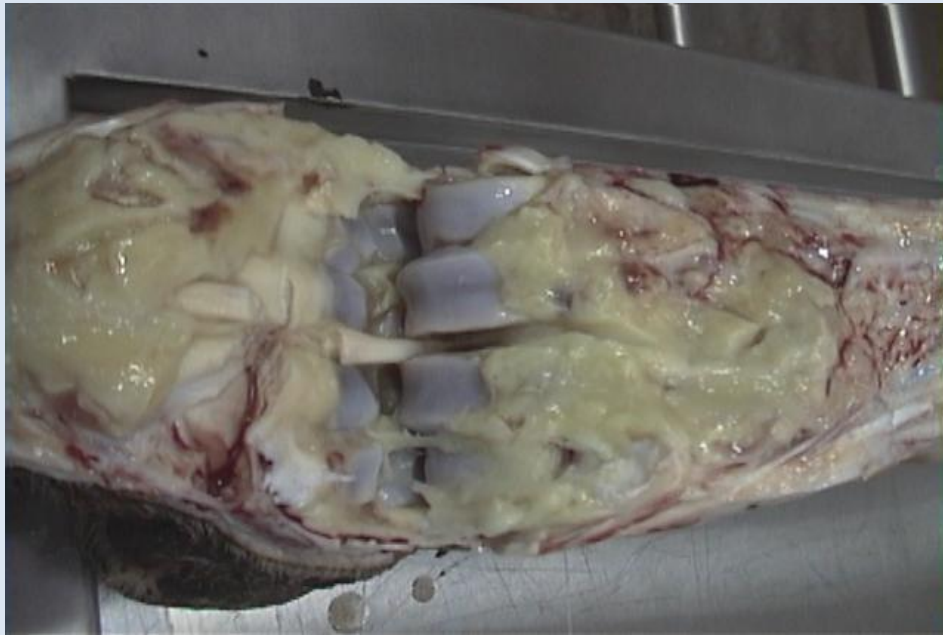
An 8 week old Beefmaster calf presents with a 2 day history of rapid and labored respiration, depression, salivation, nasal and ocular discharge, and a "honking" cough. On physical exam, there are no signs of sepsis, but the calf is tachypneic, dyspneic and febrile. Crackles are audible throughout the lung fields. What is your top differential?

- Haemophilus pleuropneumoniae
- Bovine respiratory syncytial virus
- Pasteurella multocida
- Mannheimia hemolytica

Explanation - The correct answer is **bovine respiratory syncytial virus**. The key to being able to make this your top differential is noting that the calf has a "**honking**" cough, dyspnea, and tachypnea, that the calf is **not septic**. Pulmonary lesions include severe **edema and emphysema**. Treatment is usually supportive and antibiotics are given to protect from secondary bacterial infection. *Mannheimia hemolytica* is the main culprit in shipping fever, and *Haemophilus pleuropneumoniae* is an occasional cause of shipping fever in cattle. *Pasteurella multocida* can be a secondary invader in any bovine pneumonia. *P. multocida* also causes the most economic loss in swine with atrophic rhinitis.

Question

You are presented a dead 4-month old dairy heifer for postmortem exam with a history of lameness and fevers in the group. The owner tells you that several other animals are affected, with more appearing every day. You find pneumonia (ventral yellow firm nodules in a consolidated lung) and polyarthritis (see image) as well as tenosynovitis. What organism is most likely to be the cause of such an outbreak?



- *Mycoplasma bovis*
- *Histophilus somnus*
- *Mycoplasma agalactiae*
- *Pasteurella hemolytica*
- *Mannheimia hemolytica*

Explanation - In young calves *M. bovis* can cause **head tilt, aural discharges, facial paralysis, ataxia**, and **nystagmus** as **ear infections** occur. In older cows it can cause **pneumonia**, with or without the **arthritis** and **tenosynovitis**. It can also cause mastitis, abortion and other disorders.

Question

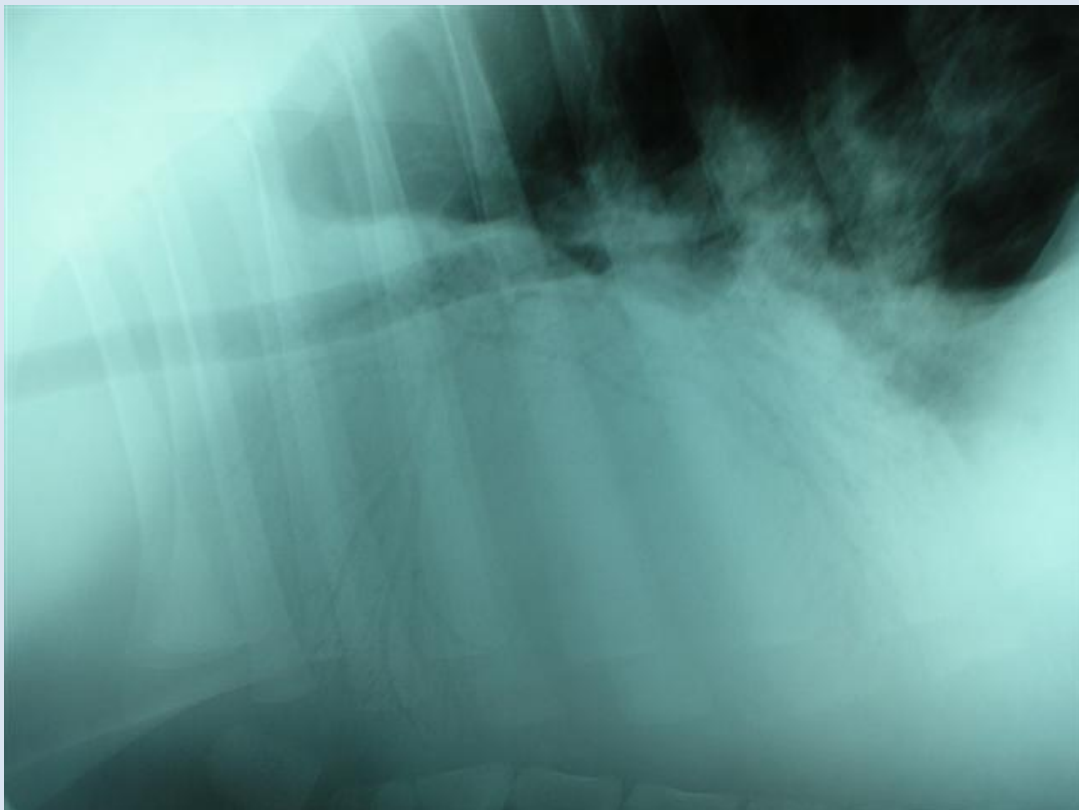
A 7-month old feedlot steer has died after exhibiting severe fever, dyspnea, cough and respiratory distress. On post mortem there is evidence of fibrinopurulent bronchopneumonia (see image). What bacterium is most likely to be the cause of this syndrome?

- *Pasteurella multocida*
- *Mycoplasma bovis*
- Bovine herpes virus type 4
- *Mannheimia hemolytica*
- *Arcanobacterium pyogenes*

Explanation – The correct answer is *Mannheimia hemolytica*. Other agents may also be isolated, but this is recognized as the worst pathogen in bovine pulmonary disease. It was formerly called *Pasteurella hemolytica*.

Question

You are presented with a 5 week old female Jersey calf with fever, tachypnea, tachycardia, lethargy, poor appetite and dyspnea. On auscultation, the ventral thorax is bilaterally harsh on both inspiration and expiration, with wheezes, crackles and popping sounds. The lateral view radiograph of the thorax is shown. What can be determined from the radiograph?



- The cardiac shadow is enlarged

- There is a large volume of fluid in the thoracic cavity
- The middle sized and large airways are open and normal
- There is severe ventral consolidation of the lung
- There is a pneumothorax and the lungs have collapsed

Explanation - This is a radiograph of severe pneumonia in a calf with air bronchograms in the ventral lung fields. Air bronchograms indicate consolidation of the ventral lung. On exam of this calf, you would expect the lung to percuss dull ventrally, and be meaty and consolidated on post mortem.
