

OAKLAND CUSD #5

BSAA ANIMALS

MAY 4 - 8, 2020

JEFF COON

Week of May 4-10, 2020

All of these assignments are on google classroom. You must pick one of the 3 listed and complete by next Monday May 16th for credit. If you would like to use google docs to complete the work that would be most efficient, just remember to start a new copy with your own work please. Paper copies can be returned to the school.

Class	Choice 1	Choice 2	Choice 3
Ag Science	CDE	DNA	Ag and Environment
Ag Business Mang	Investments	Life Insurance	Bus. Plan
BSAA	Seed Germination	Animal Diseases	Ag and Environment
Landscape Design	Soil Erosion	Annuals and perennials	Building walls and decks
Intro To Ag	FFA Meetings	FFA opportunities	Role of Agriculture
Ag Mech.	Concrete	Hydraulics	GSI

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Checking Your Knowledge: Part One:

Matching Instructions:

Match the word with the correct definition.

- a. Anemia f. internal parasite b. chronic disease
g. parasite c. dehydration h. Vaccination
d. Disease i. virus e. Fungus j. vital signs

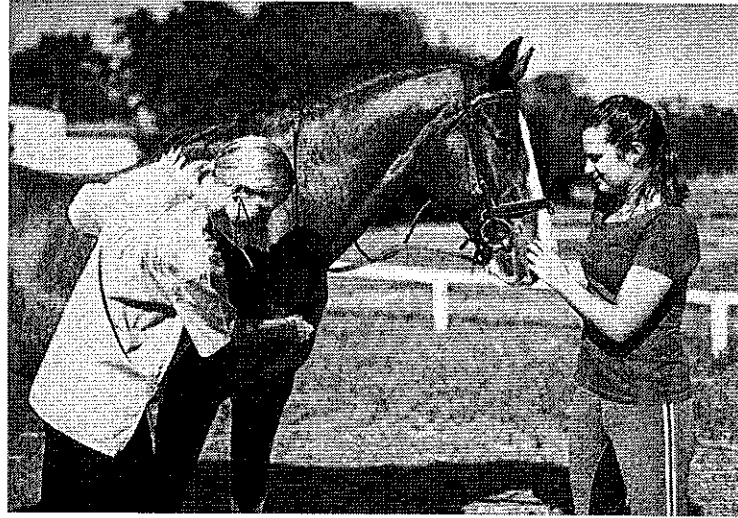
- _____ 1. a spore-forming organism that feeds on living matter
_____ 2. an illness related to the dysfunction of an internal system or structure
_____ 3. an injection of a disease-fighting medicine
_____ 4. the measurements of temperature, pulse, respiration, capillary refill, and blood pressure
_____ 5. a deficiency of red blood cells
_____ 6. an illness that is reoccurring or lasts for extended periods
_____ 7. a microorganism that can only multiply in living cells and is composed of RNA or DNA surrounded by a protein sheath
_____ 8. an organism that gains nourishment or protection from another organism by living in, with, or on it
_____ 9. a parasite that lives inside of its host
_____ 10. an excessive loss of water in the body

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**E-UNIT
C4-2**

Disease Diagnosis and Management

Disease diagnosis and management are both important to livestock owners, since diseases can cause huge economic losses. In many cases, pathogens are easily transferred from one animal to another. Diagnosis begins with a thorough medical history and physical examination of the animal. A veterinarian will help you work toward developing an accurate diagnosis and treatment plan for your animal.



Objective:

Describe how to examine an animal for disease.



Key Terms:

- | | | |
|-----------------------------|-------------------------|-----------------------|
| acute disease | external parasite | pathogen |
| anemia | fecal examination | physiological disease |
| bacterium | fungus | protozoan |
| capillary refill time (CRT) | host | solitary behavior |
| chronic disease | internal parasite | vaccination |
| contagious disease | lab test | venipuncture |
| dehydration | noncommunicable disease | virus |
| disease | parasite | vital signs |

Diagnosing and Managing Diseases

A veterinarian and owner should work together to keep animals healthy. A healthy animal is less vulnerable to disease and can recover more quickly from an illness. A **disease** is an illness related to the dysfunction of an internal system or structure. In order to diagnose and manage a disease, it is important that you know the main health indicators, methods for diagnosis, classifications, common diseases, and management strategies.

HEALTH INDICATORS

Good health is the absence of disease. You can often know an animal's health through simple observation. Common health indicators are found in mucous membranes, feces, urine, overall appearance, body language, and behavior.

Mucous Membranes

Mucous membranes are moist layers of epithelial tissue that line body parts that have both internal and external contact with air. The eyes, inner nose, gums, trachea, and lungs all have mucous membranes. Healthy gums should be pink. If the membrane color is pale, the animal may be anemic.

Feces and Urine

In many cases, fecal examinations are used to check for the presence of worms or other parasites. A **fecal examination** is a microscopic evaluation of feces. By viewing fecal particles (immersed in saline solution under a microscope), clues to whether an animal has internal parasites can be found. (The direct smear and the flotation method are two common fecal examination methods. Learn more about parasitology and fecal examination methods by viewing Merck's "Veterinary Manual" at <https://www.merckvetmanual.com/clinical-pathology-and-procedures/diagnostic-procedures-for-the-private-practice-laboratory/parasitology>.)

Dehydration and Diarrhea

Discolored or loose feces should be a cause for concern and observation. Diarrhea can be a temporary problem or an indicator of more serious health issues. Prolonged diarrhea can lead to severe dehydration. **Dehydration** is an excessive loss of water in the body. Levels of dehydration can be determined by pinching an area of skin and timing how long the skin takes to return to its normal shape and color. Healthy skin immediately returns to normal. If the skin "tents" (stays in a pinched position) for more than a second, the animal is dehydrated.

Urine

Urine analysis and observation can also be indicators of health. Urine should be pale yellow. Discolored urine can be a sign of nutritional or digestive health problems. Darker urine can indicate blood becoming mixed with urine in the kidneys, bladder, or urinary tract. Dark-colored or limited output of urine could also indicate dehydration. Any changes in urine output or color should result in treatment by a veterinarian.

Animal Appearance

Observing the overall animal appearance is another way to assess health. Animals that fall below the normal weight range for their species or breed may be unhealthy, especially if their food intake is normal. Healthy animals have sleek, shiny coats, and their skin appears well pigmented and moisturized. Dry or rough skin can indicate a skin rash or irritation. Hair loss or dull hair can also signify skin problems, such as mange.



FIGURE 1. A dog with mange.

Body Language and Behavior

An animal's body language and behavior are other indications of its health. Healthy animals have an alert posture (e.g., a raised head and ears). A sick animal will often hunch its back, lower its head, and let its ears droop in unnatural positions. An animal should appear content while relaxed. If an animal appears uncomfortable when it stands or lies down, it may have a medical problem that needs immediate attention. Constant scraping

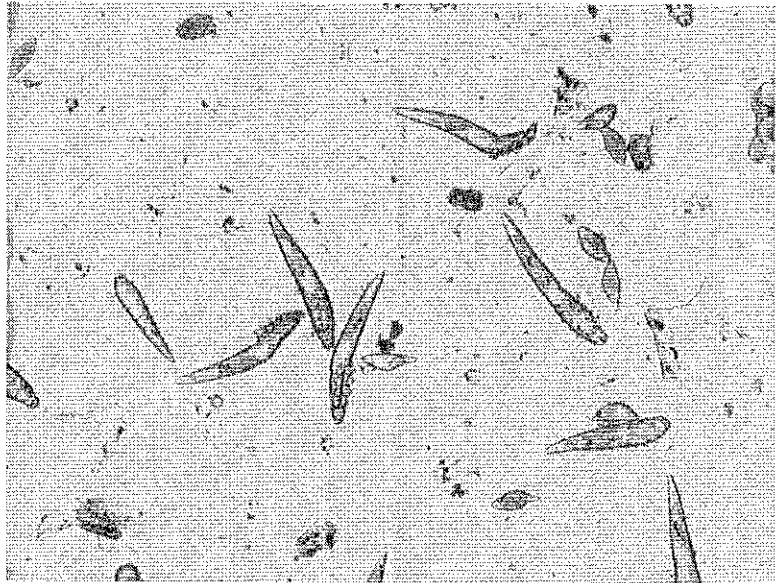


FIGURE 2. A microscopic view of mange. Mange is caused by a parasitic mite and is highly contagious. These mites are closely related to the scabies that affect humans.

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against stationary surfaces, vocalizing, and limping are all issues that should be addressed.

Mood changes can also indicate underlying issues. During birth or illness, an animal will generally leave a high activity area and move to an isolated place. **Solitary behavior** is the act of an animal isolating itself from the group. An animal, even a domesticated one, tends to hide when it is sick or in a weakened state to avoid becoming prey. Aggression, obsessive behavior, tongue rolling, calf suckling, and kicking are all actions that could denote a health problem. A producer who pays close attention to the herd and knows their behavior patterns will know when an animal is ill. The early identification of a sick animal may save the animal and the herd.

METHODS USED TO DIAGNOSE DISEASE

In order to properly diagnose a disease, a veterinarian (vet) will collect a medical history of the animal, complete a physical exam, take labs (if needed), and then evaluate the findings.

Medical History

A veterinarian starts with a thorough medical history of an animal. This is one of many reasons why keeping accurate health records is important. Vets tailor their questions to the species that they are treating. For example, asking about a horse's purpose (work, trail riding, racing, stunt riding) would be key to determining muscular and/or bone issues. On the other hand, a cat doesn't have jobs to do like a horse, so the question is irrelevant to the species. The age, breed, sex, reproductive status, prescribed medications, and purpose of the animal will be important factors when dealing with livestock issues. The vet will also look at previous infections and other medical records.

Physical Examination

Next, a vet performs a physical examination of the animal. The physical examination includes general appearance and vital signs, but it also extends to the body systems. The symptoms of the animal will determine the extent of the physical examination. Vital signs vary among different species. The **vital signs** are the measurements of temperature, pulse, respiration, capillary refill, and blood pressure. **Capillary refill time (CRT)** is a measurement of how quickly blood refills the capillaries within body tissue. In a human, this would be determined by pressing on the nail bed to see how long it goes back from white to pink. In a dog or other animal, it can be checked by pressing on the gums. In a healthy animal, the gums will turn white and then quickly turn back to pink within one to two seconds. In an unhealthy animal the refill time will be much slower. Mucous membranes are checked by examining eyes, gums, and nostrils. See TABLE 1 for areas that may be assessed during a physical exam.

TABLE 1. The Physical Examination	
Area of Assessment	Observations
General Appearance	Awareness, movement, overall body condition, membrane color, and stance
Vital Signs (Cardiovascular & Respiratory)	Temperature, pulse, respiration, blood pressure, CRT, overall body sounds (heart, lungs, and airways), and breathing problems (coughing, and/or sneezing)
Skin	Hair loss, rashes, tent test, and general appearance (glossy coat and pink skin)
Lymph Nodes	Size, shape, and sensitivity of lymph nodes
Mammary System	Appearance (swelling or discharge)
Musculoskeletal System	Movement (head, neck, and legs), protrusions, swelling, or soreness
Nervous System	Alertness, coordination, reflexes, and response to light or movements
Reproductive System	Color and condition of genitalia and anus
Urinary System	External structures and urinary output
Digestive System	Mouth, swollen stomach, gas sounds, and fecal output

TABLE 2. Normal Vital Signs for Various Animals				
Animal	Rectal Temperature		Respiration Rate	Pulse Rate
	°F	°C		
Cattle	101.5	38.6	30	50
Sheep	102.3	39.1	19	75
Swine	102.5	39.2	16	60
Horses	100.0	37.8	12	45
Goats	102.3	39.1	15	80
Chickens	107.1	41.7	25	275
Dogs	102.0	38.9	22	100

Lab Testing

When necessary, a vet may request lab testing. A **lab test** is the use of medical equipment to observe tissues and/or fluids for abnormalities. Blood and urine are two fluids commonly tested. Feces, cells, milk, and semen are also common test samples. Generally, blood is first used to determine the presence of disease. For example, a blood sample can

be drawn from a cat to determine if the cat has feline AIDS or leukemia. Blood samples are collected by venipuncture. **Venipuncture** is the piercing of a vein to withdraw blood or inject medication. The best location to collect blood on small animals is in the jugular. Larger animals (like humans and cows) have other prominent veins that can be utilized. While horses are large, the simplest and safest place for blood collection is from the jugular. Horses are emotional, and the ability to keep the animal calm makes collection go more smoothly. Blood can be drawn from cows in a vein under their tail. This involves making sure they are properly secured in a squeeze chute.

Samples must be collected and handled correctly to avoid contamination. Samples should be submitted for testing immediately, so many veterinary clinics have testing labs in their facilities.

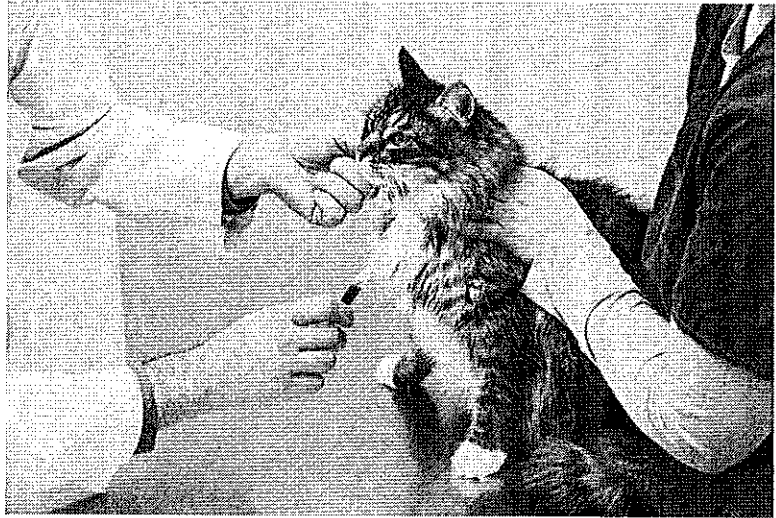


FIGURE 3. A veterinarian drawing a blood sample from a cat.

DISEASE CLASSIFICATIONS AND TYPES

Some diseases are specific to a certain type of animal or livestock, and they can be controlled through vaccinations. A **vaccination** is an injection of a disease-fighting medicine. Vaccinations include a low, inactive dose of the disease organism itself, allowing antibodies to be naturally produced in case of later infection. The key to disease management is prevention. A healthy animal is a disease-resistant animal. Always monitor an animal's environment, sanitation, nutrition, biosecurity, and vaccination schedule. Diseases can be classified as contagious, noncommunicable, acute, or chronic. Livestock can have a variety of diseases, and these diseases can intersect different classifications. For example, a disease may be chronic and noncommunicable (such as cancer) or acute and contagious (like bird flu).

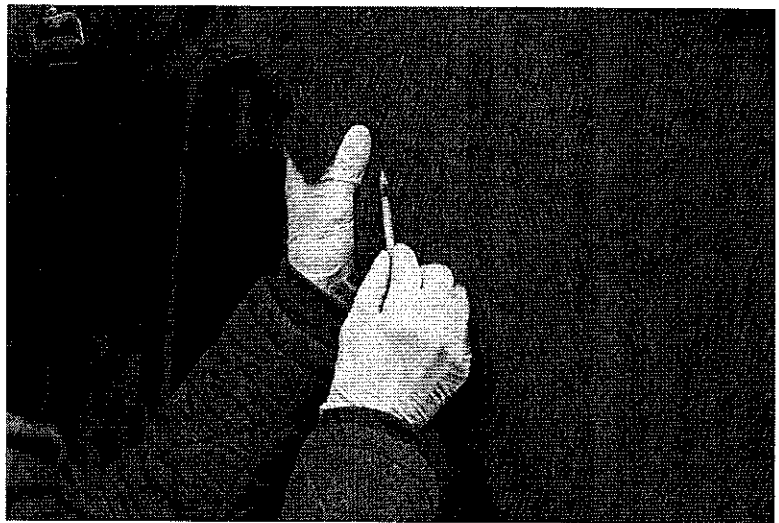


FIGURE 4. The vaccination of a horse in the neck region.

Contagious Diseases

A **contagious disease** is a type of disease that can be spread through direct contact, physical or otherwise. Sometimes these diseases are passed through fluids or breathable air. A **pathogen** is a disease-causing agent. Contagious diseases are caused by pathogens such as viruses, bacteria, fungi, protozoa, and parasites.

Viruses

A **virus** is a microorganism that can only multiply in living cells and is composed of RNA or DNA surrounded by a protein sheath. A virus closely resembles the DNA of animal cells and can multiply quickly. Since both the virus and living cell may have DNA, killing a virus without harming the animal's DNA is tricky. Therefore, treatments for viruses are limited, and vaccinations are the most effective way to prevent a virus from spreading. In humans, influenza (the flu) is the most commonly vaccinated virus. Examples in the animal kingdom include rabies, bird flu, and hog cholera.

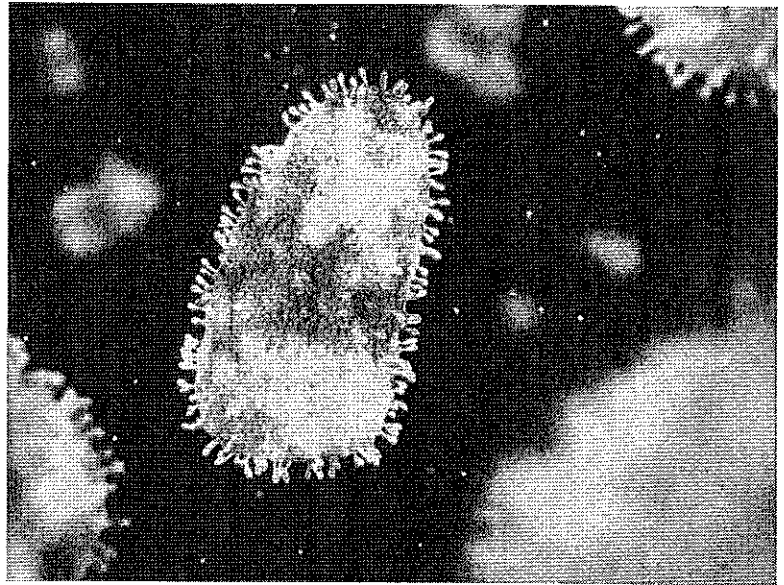


FIGURE 5. Rabies is a deadly virus that affects the nervous system.

Bacteria

A **bacterium** is a one-celled microorganism that lacks a true nucleus. Bacteria have prokaryotic cell structures, meaning their cells are disorganized and without a bound nucleus, so the DNA is located in cytoplasm. Bacteria replicate through fission or spore creation. Treatment for a bacterial infection is generally an antibiotic. The best treatment is prevention. Make sure your animals have good nutrition and live in a dry, clean environment. If your animal should contract a bacterial disease, contact your vet.

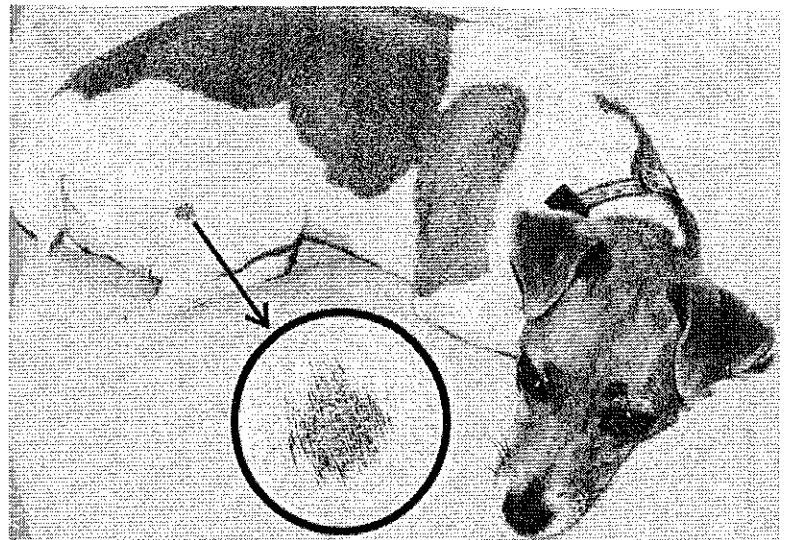


FIGURE 6. Jack Russell Terrier suffering from ringworm on its rump.

Fungi

Fungal diseases are typically found on the skin. A **fungus** is a spore-forming organism that feeds on living

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matter. Generally, fungal infections are in the form of yeast or mold. Examples of fungal infections include ringworm and coccidiosis. Unless an animal has immune issues, antifungal medications usually clear up infections quickly.

Protozoa

A **protozoan** is a parasitic, single-celled microorganism that can only multiply within a host organism. Examples of diseases caused by protozoa are malaria and anaplasmosis.

Parasites

A **parasite** is an organism that gains nourishment or protection from another organism by living in, with, or on it. A **host** is the organism that a parasite lives in or on. An **internal parasite** is a parasite that lives inside of its host. Examples of internal parasites are tapeworms, roundworms, and hookworms. An **external parasite** is a parasite that lives on the outside of its host. Examples of external parasites include fleas, ticks, lice, mites, and leeches.

Noncommunicable Diseases

A **noncommunicable disease** is a type of disease that cannot be spread to others. It can be caused by diet, physiological issues, or genetics.

Diet

Most nutritional deficiencies happen due to an unbalanced diet. Carbohydrates, fats, minerals, proteins, and vitamins are very species specific when it comes to diet. Make sure that you are feeding your animals a balanced diet for their species. Nutrient levels too high or too low can cause a nutritional disease. Rickets is a disease caused by a vitamin D deficiency. The lack of cobalt (vitamin B₁₂) in livestock can cause a wasting disease in young animals.

Physiological Issues

A **physiological disease** is a disorder of body parts or functions. This can be a limb deformity or deeper issues with tissue, organs, or body systems. Physiological diseases might include milk fever, birth defects, and heart failure. Milk fever is a lack of calcium in a mother after birth.

Physical injuries have the potential to affect the overall production of the animal. Injuries could be as simple as cuts, scratches, and bruises. On a much larger scale, a broken bone can be a death sentence for large animals. Keeping animals in a safe environment will assist in limiting these types of injuries.

Genetics

Some diseases are genetically determined. Different species and/or bloodlines have different genetic disorders. For instance, in horses there is hyperkalemic periodic paralysis

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(HYPP). HYPP is a muscular disease caused by an inherited genetic mutation. HYPP has been traced back to a stallion named Impressive, which is why the disease is sometimes referred to as the Impressive syndrome. Muscle tremors, paralysis, and weakness are some common symptoms of horses with HYPP.

All living creatures are susceptible to cancer. If an animal lives long enough, abnormal cells can start dividing uncontrollably. This abnormal cell division is cancer. Even sharks get cancer! In dogs and cats, leukemia and lymphoma are common cancers.

Acute and Chronic Diseases

An **acute disease** is a short-lived, serious illness. Generally, there is a sudden appearance of symptoms that progress quickly. A **chronic disease** is an illness that is reoccurring or lasts for extended periods. Often, the symptoms of chronic diseases resemble those of a variety of illnesses, making diagnosis and treatment particularly difficult. Since an animal can't tell you its symptoms, your daily observations are important for catching chronic or acute issues. These diseases can be contagious or noncommunicable. BSE (mad cow disease) is a contagious, chronic brain disease. Diarrhea can be an acute, noncommunicable issue in an animal. Left unchecked, this can cause dangerous levels of dehydration.

Common Diseases

Diseases can be species specific or attack multiple species. For instance, roundworms can affect horses, sheep, goats, pigs, cattle, dogs, and cats. Alternatively, equine sleeping sickness only affects horses. Most of the diseases listed in this section are common. They may be acute or chronic, as well as contagious or noncommunicable.

Anemia

Anemia is a deficiency of red blood cells. Red blood cells carry oxygen to organs, muscles, and tissue. A lack of energy or confusion may be a result of anemia, since the body (especially the brain) is not getting enough oxygen for routine functions. Sometimes anemia may be caused by parasites that feed off the animal's blood, such as worms. A lack of minerals in the diet, such as iron, can also cause anemia. This condition can be a sign of a far more serious disorder and should be checked by a veterinarian. Prolonged anemia can cause an irregular pulse, lethargy, an increased susceptibility to other illnesses, and death.

Yellow Fever

Anaplasmosis (yellow fever) is a parasitic disease that primarily affects cattle, but it can be seen in sheep and goats. This disease is acute, but can cause chronic symptoms in those animals lucky enough to live through it. This is a contagious disease, and generally starts in the form of a tick or insect bite. It is caused by a protozoan that attacks red blood cells. The symptoms include anemia, lethargy, loss of body condition, and jaundice (yellowing of the eyes). Some treatments are available if the disease is caught early.

Otherwise, death may occur in a few days. Younger cattle have a higher mortality rate with this disease.

Anthrax

Anthrax is an acute infectious disease that can attack most warm-blooded animals. It mainly affects livestock during summer months, when they are in the pasture. A bacterium, *Bacillus anthracis*, can live in dirt for years. Once that dirt is inhaled or eaten, the bacteria start producing spores, causing immediate skin irritation and swelling at the point of entry. Symptoms include fever, rapid breathing or wheezing, swollen nodes or organs, and sudden death. There are preventive vaccinations, and for treatment, high doses of penicillin are necessary.

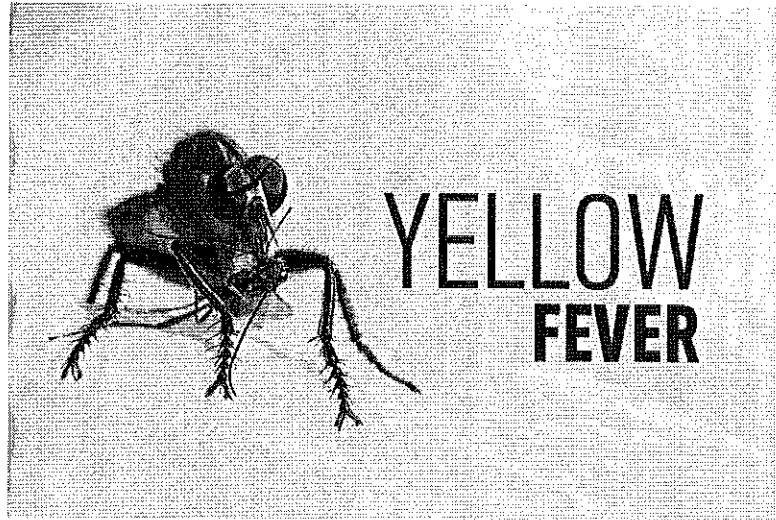


FIGURE 7. Anaplasmosis (yellow fever) is a contagious, parasitic disease that generally starts in the form of a tick or insect bite (such as a mosquito).

Bloat

Bloat occurs when gas builds up in the rumen during fermentation. With fermentation, the byproduct is CO₂ and methane. The CO₂ and methane must be expelled to prevent bloat. Bloat is swelling from the buildup of gases. In ruminants, this often occurs when an animal eats larger quantities of green forages than they can digest. Ideally, as the gas builds, an eructation (a belch or the act of belching) occurs. Eructation rids the rumen of gas. Bloat is one of the most common causes of death in cattle. Mineral blocks can reduce the likelihood of bloat and should be available to animals before they are turned out onto fresh forage. Although this is a noncommunicable disease, bloat is generally due to an overabundance of clover or alfalfa that grows in the spring. This growth in a pasture affects all of the cattle that graze there. If bloat happens, all cattle should be moved off the pasture and given a high-fiber diet (of hay or straw) for a few days. Bloat can kill in minutes, not hours.

BRD

Bovine respiratory disease (BRD) is a broad term for infections of the respiratory system of cattle. Generally, it is associated with calves that have arrived at the feedlot after weaning, which is why it is also called shipping fever. Older and younger animals have a weaker immune system. They can get lung infections that easily progress to pneumonia and death. Symptoms include eye and nostril discharge, coughing, wheezing, and a high body temperature. Canada's Beef Cattle Research Council (BCRC) has an in-depth look at

causes and solutions on its website at <http://www.beefresearch.ca/research-topic.cfm/bovine-respiratory-disease-38>.

Brucellosis

Brucellosis is an infectious disease of the reproductive tract of cattle, sheep, goats, and hogs, and it can be spread to humans. This disease is from a bacterium, *Brucella abortus*, that attacks females. Also known as Bang's, this disease causes developing fetuses to be aborted or prematurely born. This is an acute, incurable disease that can be prevented with a vaccination to females in their first 4 to 12 months of life. Even with no symptoms, this disease can be present. Contact with infected animals or unpasteurized products (such as milk and cheese) can pass this bacteria to humans. This will affect male and female humans with pain, fever, fatigue, and other illnesses. Antibiotics are used to try and kill the bacteria.

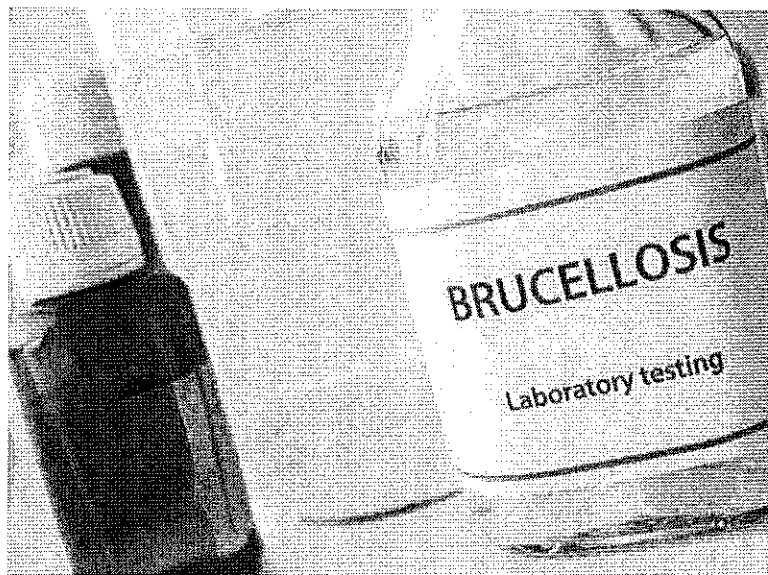


FIGURE 8. Brucellosis is an infectious disease of the reproductive tract of cattle, sheep, goats, and hogs, and it can be spread to humans.

Coccidiosis

Coccidiosis is a parasitic disease of the intestinal tract most commonly associated with poultry. (It can affect any livestock.) Coccidiosis can be treated with a medication in the feed and water. Symptoms include bloody feces, ruffled feathers, sick appearance, and pale coloring. Birds must be isolated for treatment since the disease is contagious.

Encephalomyelitis

Equine encephalomyelitis (sleeping sickness) is an acute, dangerous disease caused by a brain virus from insect bites. Initial symptoms include fever and depression, diarrhea, lethargy, self-mutilation, excitability, irritability, and a refusal of food or water. As it progresses into the central nervous system (CNS), symptoms escalate. Incoordination, odd head movement, constant circling, paralysis, convulsing, coma, and death can all occur within two to three days of the initial symptoms. Although most horses die within two to four days, some may recover—with brain damage. According to Ashley Griffin from the University of Kentucky, there is no cure, but forcing fluids and feeds into the horse, keeping it cool, and rotating its laying positions will all aid in keeping it strong enough to

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survive. Immunization and mosquito control are recommended for prevention. Vaccinations should be given before mosquito season.

Overeating Disease

Enterotoxemia (overeating disease) is a bacterial disease that affects sheep and goats. As with most livestock diseases, prevention is easier than treatment. Enterotoxemia is caused by two strains of a certain bacterium, *Clostridium perfringens*. These strains, C and D, are generally found in a dormant phase within the intestinal walls. Changes in feed and overall diet can wake them up. Feeds that are too rich in starch, sugar, or protein tend to be the most problematic. Symptoms include lethargy, pain, diarrhea, blood in the stool, convulsions, and death. After convulsions begin, death is certain. Different probiotics and antibiotics can treat this disease; however, they are so acute that the animal may be dead before the notice of any symptoms. Vaccinations and proper feeding management are critical to preventing this disease.

Foot-and-Mouth Disease

Foot-and-mouth disease (FMD) is extremely contagious, and generally affects only animals with cloven hooves (hooves that are divided). This is a viral infection with no treatment or cure. An infected animal gets watery blisters around the mouth and on its feet. The animal should be quarantined immediately. The United States does not have a problem with this disease. For this reason, strict rules apply when shipping cloven-hoofed animals into the United States.

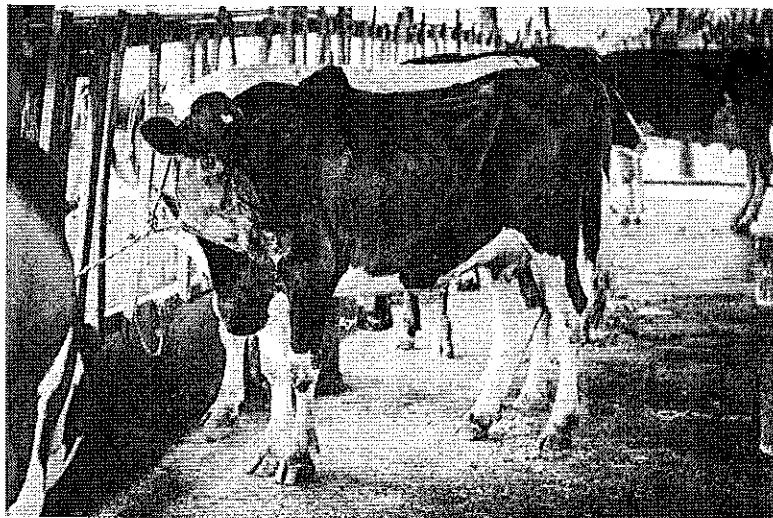


FIGURE 9. This cow has foot and mouth disease. Note the areas highlighted in purple that show the effects of the disease.

Founder

Founder (laminitis) is a painful foot disease that mainly affects horses. It is a swelling and degeneration of the tissue folds that connect the pedal bone to the hoof (the laminae). This swelling causes a decrease in blood flow. It is commonly caused by the overeating of carbohydrates, excessive consumption of cold water, rapid changes in rations, or blood poisoning from another trauma. Symptoms include lameness, fever, swelling above hooves, and sweating. Anti-inflammatory medications and diet regulation

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are generally used to treat founder. Some horses may never recover and have to be put down.

Leptospirosis

Leptospirosis is a bacterial disease that affects humans and animals. The bacterium that causes this infection comes from the urine of animals. The bacteria from urine can live in the soil for extended periods of time, infecting animals and humans that come into contact with it. Sometimes there are no symptoms, but generally vomiting, abdominal tenderness, diarrhea, refusal to eat, and muscle pain can be noted. Leptospirosis can cause aborted fetuses or sterility. Vaccination against leptospirosis is recommended and antibiotics can be used for treatment.

Mastitis

Mastitis, inflammation of mammary glands, is a bacterial disease that affects female cattle, sheep, goats, and swine. It causes an inflammation of the udder that interferes with milk production. Although treatable with antibiotics, chronic mastitis can lead to death of the animal. Milk from a diseased animal cannot be sold for consumption or any use.

Pinkeye

Pinkeye (infectious keratoconjunctivitis) is an eye infection that causes the cornea to become cloudy and pink. Generally, contact with infected animals (such as at shared drinking troughs) will transmit the disease. It is treatable with antibiotics and sulfa drugs. Pinkeye is common among sheep, cattle, and pets.



FIGURE 10. A Herford steer with pinkeye.

Rabies

Rabies is an infectious viral disease that can occur in nearly every warm-blooded animal. Transferred through the bite of an infected animal, this disease can be spread to humans. This disease affects the central nervous system (CNS), so infected animals may become “crazed,” exhibit aggressive behavior, lose control of limbs, and die. Although treatment is available for humans, animals with rabies die within days. Generally, an autopsy is required to diagnose the disease. There are experimental vaccinations that can aid in an animal’s recovery, but they are not fail proof and require isolation for four to six months. This puts an unnecessary strain on the animal, so the CDC recommends euthanasia.



Digging Deeper... UNCOVERING ADDITIONAL FACTS

Vital Signs and Animal Health

Vital signs for a horse include pulse rate, respiration rate, capillary refill rate, gut sounds, and body temperature. For example, 98.6°F is the normal body temperature for humans. All mammals have vital signs that indicate their well-being. Veterinarians utilize these signs as the starting point in an examination. The vital signs are reviewed to note any changes from earlier exams. A horse's temperature should be around 99°F to 101°F.

Animal owners should know the vital signs for their pets. Go to the Horse Journal's website to learn how to take the vital signs of a horse at <https://www.horsejournals.com/checking-your-horses-vital-signs>.



TSE

Transmissible spongiform encephalopathy (TSE) is a group of diseases of unknown cause that affect the central nervous system. Bovine spongiform encephalopathy (BSE) is commonly called mad cow disease. Cows affected by BSE exhibit nervousness, general lack of muscle control, and weight loss. There is no cure for BSE, so the disease eventually results in death. Because of a suspected relationship between BSE and the feeding of mammal-derived protein, the FDA banned the use of such protein in cattle feeds. BSE can be transmitted to humans only through the consumption of spinal cord tissue, which is fully removed from the meat supply when an animal is harvested in the United States.



Summary:

A veterinarian and owner should work as a team to keep animals healthy. A healthy animal is less vulnerable to disease and can recover more quickly from illnesses. In order to diagnose and manage disease, it is important that you know the main health indicators, methods for diagnosis, classifications, common diseases, and management strategies.

Good health is the absence of disease. You can often know an animal's health through simple observation. Common health indicators are found in mucous membranes, feces, urine, overall appearance, body language, and behavior.

In order to properly diagnose a disease, a veterinarian (vet) will collect a medical history of the animal, complete a physical exam, take labs if needed, and then evaluate findings.

A disease is an illness related to the dysfunction of an internal system or structure. Some diseases are specific to a certain type of animal or livestock, and they are generally controlled through vaccinations.

The key to disease management is prevention. A healthy animal is a disease-resistant animal. Always monitor an animal's environment, sanitation, nutrition, biosecurity, and vaccination schedule. Diseases can be classified as contagious, noncommunicable, acute, or chronic. Livestock can have a variety of diseases, and these can be classified in different ways. For example, a disease may be chronic and noncommunicable (such as cancer) or acute and contagious (like bird flu).



Expanding Your Knowledge:

Visit a local vet clinic. Talk with a veterinarian about common diseases in your area. Speak with a vet tech about training and opportunities. Take a trip to a large-animal operator. Speak with them about disease, vaccinations, and veterinary care.



Checking Your Knowledge:

■ Part One: Matching

Instructions: Match the word with the correct definition.

- | | |
|--------------------|----------------------|
| a. anemia | f. internal parasite |
| b. chronic disease | g. parasite |
| c. dehydration | h. vaccination |
| d. disease | i. virus |
| e. fungus | j. vital signs |

- _____ 1. a spore-forming organism that feeds on living matter
- _____ 2. an illness related to the dysfunction of an internal system or structure
- _____ 3. an injection of a disease-fighting medicine
- _____ 4. the measurements of temperature, pulse, respiration, capillary refill, and blood pressure
- _____ 5. a deficiency of red blood cells
- _____ 6. an illness that is reoccurring or lasts for extended periods
- _____ 7. a microorganism that can only multiply in living cells and is composed of RNA or DNA surrounded by a protein sheath

- _____ 8. an organism that gains nourishment or protection from another organism by living in, with, or on it
- _____ 9. a parasite that lives inside of its host
- _____ 10. an excessive loss of water in the body

■ Part Two: Completion

Instructions: Complete the following statements.

- 1. A/An _____ is a type of disease that cannot be spread to others.
- 2. _____ is the piercing of a vein to withdraw blood or inject medication.
- 3. _____ is a measurement of how quickly blood refills the capillaries within body tissue.
- 4. A/An _____ is a microscopic evaluation of feces.
- 5. A/An _____ is a short-lived, serious illness.
- 6. A/An _____ is the organism that a parasite lives in or on.
- 7. A/An _____ is a parasitic, single-celled microorganism that can only multiply within a host organism.

■ Part Three: True/False

Instructions: Write *T* for true or *F* for false.

- _____ 1. Some diseases are passed through genetics.
- _____ 2. Although treatment is available for humans, animals with rabies die within days.
- _____ 3. In order to properly diagnose a disease, a veterinarian will first run lab tests.
- _____ 4. A disease may be chronic and noncommunicable or acute and contagious.
- _____ 5. HYPP has been traced back to a sheep named Impressive.
- _____ 6. Noncontagious diseases are caused by viruses, bacteria, fungi, protozoa, and parasites.
- _____ 7. The way to manage a disease is through its prevention.

Checking Your Knowledge:

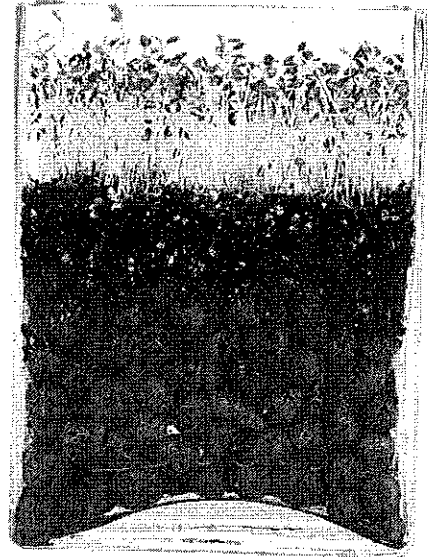
1. Explain why excess water caused by flooding or saturated soils prevents germination or reduces germination rates.

2. Why is temperature so important in seed germination?

3. Distinguish between stratification and scarification.

Conditions for Seed Germination

TYPICALLY, the embryo of the seed waits for favorable growing conditions before **seed germination**, or the beginning of growth, takes place. When the seed germinates depends on both external and internal factors. Some seeds can lie in wait for many years and suddenly spring to life when given the right conditions for seedling survival.



Objective:



Discuss environmental factors that affect seed germination.

Key Terms:



scarification
seed dormancy
seed germination
stratification

How the Environment Affects Seed Germination

What are the right conditions for a seed to germinate? Assuming the seed is internally ready for germination, attention shifts to the environmental conditions. The environmental conditions that influence germination include water, oxygen, and proper temperature. Depending on the species, light or dark conditions might be involved in seed germination. The exact need regarding each of these factors varies with the plant species. If any one of these environmental factors is not favorable, the seed might not germinate.

MOISTURE AND OXYGEN

For seeds to germinate, an optimal moisture level is needed. Most plant seeds germinate well when the soil is moist yet well drained. Since germination begins with the absorption of water, seeds lie dormant in dry soils. On the other hand, too much water can be deadly to seeds. Excess water caused by flooding or saturated soils prevents germination or reduces germination rates. This is because poorly drained soils lack good exchange of gases, particularly oxygen. Without sufficient oxygen, respiration cannot occur. Also, germinating seeds need a period of good moisture level for seedlings to survive. Developing seedlings are very susceptible to drought and to extreme wetness. If conditions shift from adequate moisture levels during germination to dry or excessively wet conditions, the death of the seedlings can be expected.

TEMPERATURE

Soil temperature is another important factor to consider. Most plant species have an optimal temperature range of between 60°F (16°C) and 80°F (27°C) for germination. Corn germinates well at 75°F (24°C), soybeans at 70°F (21°C), wheat at 65°F (18°C), and tomatoes at 85°F (29°C). The reason temperature is so important is that it influences the rate of metabolic processes. In general, temperatures below an optimal level slow the rate of metabolism, and temperatures above an optimal level increase metabolism. This is because the enzymes that drive many chemical reactions are sensitive to temperature. If temperatures are too cold or too warm, the enzymes are unable to carry out their functions. Extreme temperatures can bring growth to a halt or severely damage plant cells.

Table 8-1. Optimal Temperatures for the Germination of Some Crop Seeds

Crop	Minimum Temperature	Optimal Temperature
Corn	50°F (10°C)	75°F (24°C)
Oat	35°F (2°C)	65°F (18°C)
Pea	40°F (4°C)	75°F (24°C)
Snap bean	60°F (16°C)	85°F (29°C)
Sorghum	50°F (10°C)	75°F (24°C)
Soybean	50°F (10°C)	70°F (21°C)
Squash	60°F (16°C)	95°F (35°C)
Tomato	50°F (10°C)	85°F (29°C)
Wheat	35°F (2°C)	65°F (18°C)



UNDER INVESTIGATION...

LAB CONNECTION:

Environmental Factors Affecting Seed Germination

When growing crops outside, producers are at the mercy of the weather. Environmental conditions cannot be controlled. Seeds are planted, and then it is hoped that conditions will be ideal for germination to take place. Precipitation and temperatures fluctuate. The soil conditions have influence moisture and oxygen availability.

Producers do have some control over the success of the germination. They decide when to plant the seed, how deep to plant the seed, and how to prepare the soil. For them, it is necessary to understand how environmental factors influence seed germination.

Several exercises can be conducted to explore the effects of water, temperature, oxygen, and light have on germination. A moisture test can be done with seeds and a number of pots. The seeds are planted at the same depths and in the same type of medium. Each pot is then given a different water treatment and observed.

The effects of temperature on seed germination can be tested. Groups of 25 seeds are rolled in moist paper towels, put in plastic to prevent moisture loss, and placed in 85° to 90°F (29° to 32°C), 70° to 75°F (21° to 24°C), and 35° to 40°F (2° to 4°C) conditions. Germination rates are recorded two, five, and seven days after starting the test.

A very impressive test can be run to see the effects of oxygen on seed germination. It involves placing pre-soaked seeds in a tight-sealing jar with a steel-wool pad and in a tight-sealing jar without the steel wool. The rate of germination in each jar is observed.

Light plays a role in the germination of lettuce seeds. Lettuce seeds exposed briefly to light are placed on moist paper towels and sealed in aluminum foil. A second batch of lettuce seeds is never exposed to light and planted in the same way. After three to five days, the foils are opened to reveal the results.

LIGHT AND DARKNESS

Seed germination in some plants is regulated by light or darkness. These plants have phytochrome pigments in their seed coats. Phytochrome switches back and forth between two forms, the red light absorbing P_r and the far-red light absorbing P_{fr} . Sunlight has a higher level of red light than far-red light wavelengths. When seeds are exposed to daylight, the P_{fr} form of phytochrome increases and exceeds the P_r form of phytochrome. P_{fr} is the form that

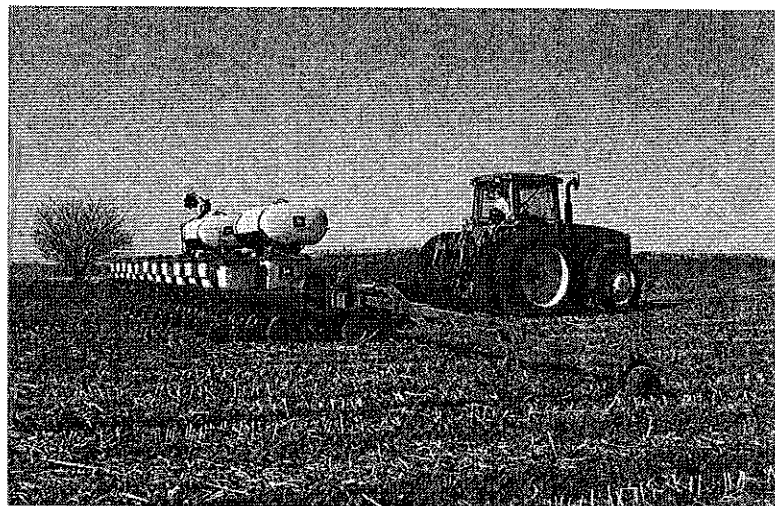


FIGURE 1. Proper planting depth provides seeds with the best possible moisture levels, air exchange, and temperatures. (Courtesy, Deere and Company)

triggers the germination response in plants. When a certain level is reached, a signal is given saying it is okay to germinate. In some plants, like lettuce, seeds require only a short exposure to light. Some plants require darkness to germinate, and others are unaffected by light.

Knowledge of environmental requirements for seed germination should guide growers. They should plan to plant seeds close to the time when soil temperatures are optimal for growth. They can make slight adjustments to the depth at which seeds are planted to provide the seeds with the best possible moisture levels, air exchange, and temperatures. If needed, they can expose seeds to light. Corn and soybeans are typically planted $1\frac{1}{2}$ to 2 inches deep. A general rule of thumb for most plants is to plant seeds at a depth equal to three times the diameter of the seed.

SEED DORMANCY

Even when environmental conditions are favorable, some seeds fail to germinate. That is because internal factors play a role in seed germination. These types of seeds are said to have **seed dormancy**. Some physiological causes of seed dormancy are immaturity of the embryo and impermeability of the seed coat to water and sometimes oxygen. Seed dormancy is an evolutionary feature that helps seeds germinate at a time when conditions will give the seedlings the best chance of survival.

With corn, soybeans, a number of vegetables, and some annuals, seeds can be planted as soon as they are ripe and thoroughly dried. They do not have seed dormancy. Many other seeds have internal factors that delay germination. In some cases, the embryo is not fully mature at the time of dispersal and must develop further before germination can occur. In other cases, a hormone, abscisic acid, inhibits germination. When the seed gets plenty of water, such as from a heavy downpour, the abscisic acid is leached from the seed. With the abscisic acid washed from the seed, the seed is free to germinate. This scenario is common with desert plants that depend on sufficient rainfall at germination to ensure survival of the seedlings.

Stratification

One mechanism some seeds have is called stratification. **Stratification** is the process whereby a seed must go through a period of cold temperatures before it will germinate. The



FIGURE 2. Corn, soybeans, a number of vegetables, and some annuals can be planted as soon as the seeds are ripe and thoroughly dried.

value of this mechanism is that it prevents the seed from germinating in late fall or early winter. Without this waiting period, a seed could germinate during a warm spell in December and die with the arrival of freezing temperatures. Spruce, apples, herbaceous perennials, and lettuce are examples of plants that require a stratification period to germinate. In agriculture, seeds are sometimes stored in cool, moist conditions to satisfy the stratification requirement.

Scarification

Another dormancy mechanism is **scarification**, or the breaking down of the seed coat. Some seeds have very hard, thick seed coats. These coats provide excellent protection for the seeds. However, a seed coat prevents the absorption of water and germination under normal conditions. The seed coat must be worn away before germination can occur. This happens in nature when seed passes through the acid stomach of an animal or lies in the soil where microorganisms eat away the seed coat. Some members of the legume family, such as sweet pea and honeylocust, require scarification. People wanting to propagate seed of one of these types physically remove part of the seed coat by filing, scratching, or placing the seed in a sulfuric acid bath.

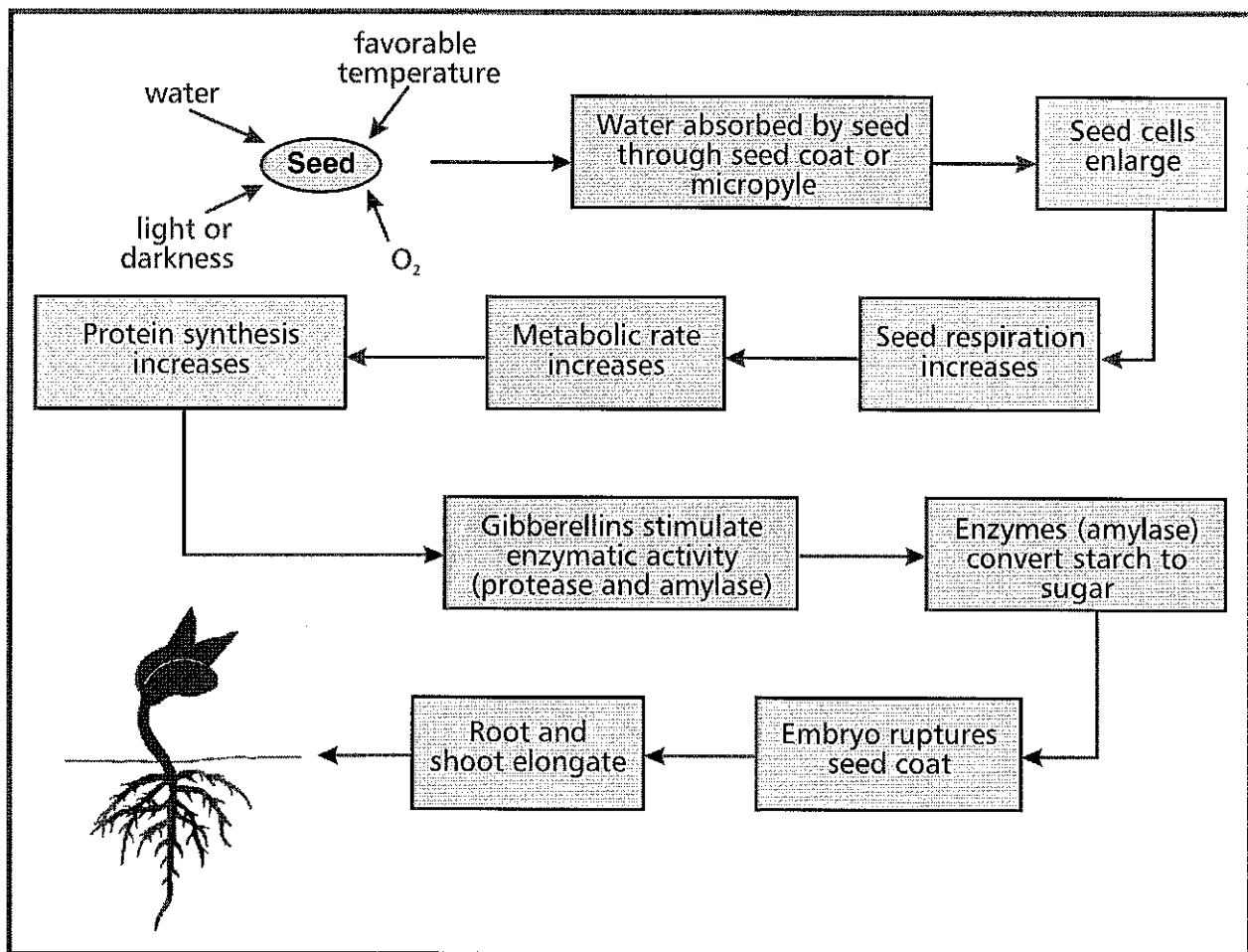


FIGURE 3. The process of seed germination can be followed on this flow chart.

BSAA 5.4 #2

Summary:



The embryo of the seed waits for favorable growing conditions before seed germination, or the beginning of growth, takes place. When the seed germinates depends on both external and internal factors. The environmental conditions that influence germination include water, oxygen, and proper temperature. Depending on the species, light or dark conditions might be involved in the seed germination. Even when environmental conditions are favorable for germination, some seeds fail to germinate because of internal factors. These types of seeds are said to have seed dormancy.

Checking Your Knowledge:



1. Explain why excess water caused by flooding or saturated soils prevents germination or reduces germination rates.
2. Why is temperature so important in seed germination?
3. Distinguish between stratification and scarification.

Web Links:



Texas Tech University—Plant and Soil Science

<http://www.pssc.ttu.edu/plantprop/lecnotes/section2/topic7.htm>

GardenWeb

<http://www.gardenweb.com/sesbania/strat.html>

Agricultural Career Profiles

<http://www.myaert.com/career-profiles>

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Option 3

Ag and Environment

May 4 Name

Checking Your Knowledge:

1. Define ecology.

2. How are environment, ecosystem, biome, and biosphere related?

3. What is the difference between renewable natural resources and nonrenewable natural resources?

Agriculture and the Environment

THE United Nations projects the world population to increase from its current 6.5 billion to 9.4 billion by 2050 and to continue growing until it reaches 11 billion around 2200. How is the world population to feed, clothe, and shelter itself? How can agricultural production be increased to meet the demands of a growing population? How can the earth's natural resources be managed so that agriculture can be sustained into the distant future?



Objective:



Discuss agriculture and the environment.

Key Terms:



biome
biosphere
community
ecology
ecosystem
environment
nonrenewable natural resource
population
renewable natural resource

Important Concepts Relating to Agriculture and the Environment

Many people associated with the agriculture industry pride themselves with being good stewards or caretakers of the land. They are concerned about the health of the land and the environment. The **environment** is the nonliving, or abiotic, aspect of an organism's immediate habitat. It includes both physical and chemical features, such as rocks, minerals, water, and air.

People involved with the production of crops and livestock and the management of wildlife must have an understanding of ecology. **Ecology** is the study of the interrelationships between living things and their environment. The field is very broad and includes both the nonliving and living aspects. It involves many other disciplines of study besides biology, such as geology, chemistry, and earth science.

Ecology involves the study of populations, communities, and ecosystems. A **population** is a group of individuals of the same species sharing the same area. A population could be one of pheasants or one of milkweed plants. A **community** is all the species or populations living in a given area. All the communities of living things on Earth compose the **biosphere**. An **ecosystem** is a community of organisms (biota) and its nonliving environment. Ecosystems vary from place to place.

Large ecological communities are known as biomes. **Biomes** are a result of complex interactions, climate, soil, and life factors. Wetland, temperate forest, tundra, and prairie are examples of biomes. Some of the most productive farmland in the world is found in prairie or temperate

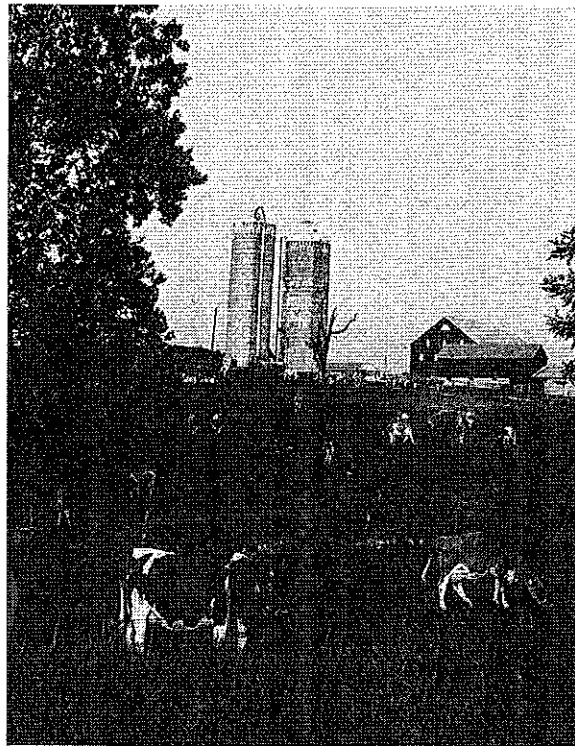


FIGURE 1. Ecology is the study of the interrelationships between living things and their environment. (Courtesy, Agricultural Research Service, USDA)

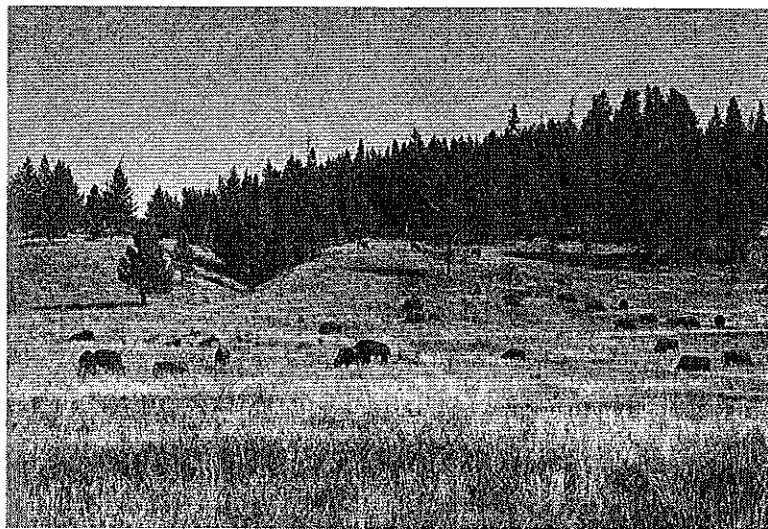


FIGURE 2. A community is all the species or populations living in a given area.

deciduous forest biomes. Some biomes, such as desert and tundra, do not support agricultural production.

RENEWABLE AND NONRENEWABLE RESOURCES

Human survival is dependent on natural resources found in the ecosystem. Resources used by people may be renewable or nonrenewable. A **renewable natural resource** is one that can be replaced. A **nonrenewable natural resource** is one that can never be replaced.

Renewable natural resources are air, water, and wildlife. Sometimes soil is also included as a renewable resource. Of course, the speed at which some of these resources can be renewed is quite

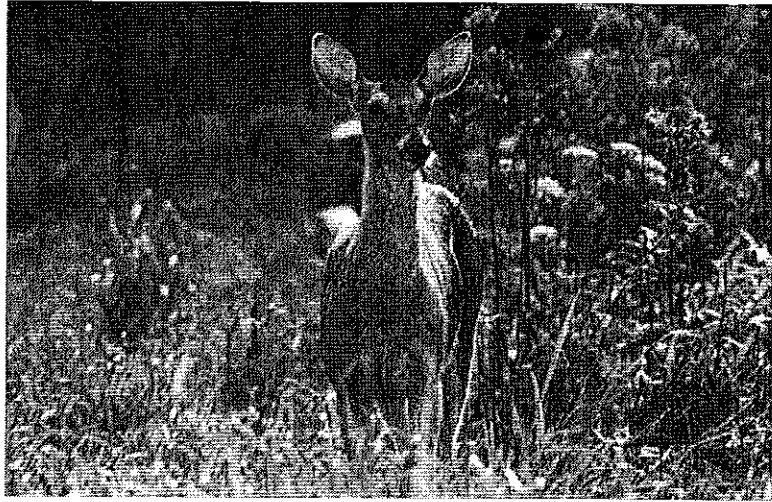


FIGURE 3. Wildlife is considered a renewable natural resource. (Courtesy, Natural Resources Conservation Service)



ON THE JOB...

CAREER CONNECTION: Environmental Scientist

Environmental scientists conduct work to protect the environment. Maintaining a healthy environment involves protecting the land, air, and water resources from wastes and pollution.

Someone with an interest in becoming an environmental scientist should plan to earn at least a bachelor's degree. Completion of a master's or doctoral degree opens additional career opportunities. An environmental scientist must have a strong understanding of biology, chemistry, and physics.

Environmental scientists might work for government agencies or private industry. Some government employers include departments of natural resources, departments of environmental protection, and the U.S. Environmental Protection Agency. Private environmental consulting firms and industries that produce waste hire environmental scientists.



This environmental scientist is inspecting wildlife habitat. (Courtesy, Natural Resources Conservation Service)

slow. Soil lost from fields can take hundreds of years to be replaced. Soil contaminated with a heavy metal, such as mercury or cadmium, is not easily cleaned, and to do so is costly. Severely polluted lakes and rivers can take years to clean. Also, wildlife is renewable only if the plants or animals have not become extinct. For instance, the passenger pigeon and the woolly mammoth are extinct and cannot be renewed.

Fossil fuels, including coal, oil, and natural gas, are examples of nonrenewable natural resources. Each of these resources has a limit. Once that limit is reached, there is no more of that resource for human use.

There is no question that humans have had a great impact on the environment. Ecosystems have been transformed, and species have become extinct. Fortunately, research based on science has revealed ways in which the negative impact of humans on the environment can be lessened.

Summary:



The environment is the nonliving aspect of an organism's immediate habitat. It includes both physical and chemical features. Ecology is the study of the interrelationships between living things and their environment. Ecology involves the study of populations, communities, and ecosystems. A population is a group of individuals of the same species sharing the same area. A community is all the species or populations living in a given area. All the communities of living things on Earth compose the biosphere. An ecosystem is a community of organisms and its nonliving environment. Large ecological communities are known as biomes. Wetland, temperate forest, tundra, and prairie are examples of biomes.

Resources used by people may be renewable or nonrenewable. A renewable natural resource is one that can be replaced. A nonrenewable natural resource is one that can never be replaced. Fossil fuels, including coal, oil, and natural gas, are examples of nonrenewable natural resources.

Checking Your Knowledge:



1. Define *ecology*.
2. How are environment, ecosystem, biome, and biosphere related?
3. What is the difference between renewable natural resources and nonrenewable natural resources?

Expanding Your Knowledge:



Using the Internet or other sources, identify the fastest growing countries in the world. Next, try to find trends in food production for those countries. Will the food

BSAD 5-4 #3

production be able to keep pace with the growth of those countries? If not, how will all the people be able to eat? Write a report on your findings, and include your ideas on what must happen for all the people to be adequately fed.

Web Links:



Renewable Resources Data Center

<http://rredc.nrel.gov/>

High School Environmental Center

<http://www.epa.gov/highschool/>

Agricultural Career Profiles

<http://www.mycaert.com/career-profiles>