



8. using a digital, electronic thermometer with a probe covered by a disposable plastic cover is a faster, safer and more accurate means of determining body temperature
- D. Pulse (P) – the rate at which the animal’s heart beats –expressed in beats per minute
1. dogs and cats – use the femoral artery that is located on the medial surface of the thigh on either hind leg
  2. Cows and horses
    - a. The mandibular artery on the underside of the jaw
    - b. Between the ribs, just back of the left elbow
- E. Respiration (R) – number of breaths per minute
1. over a 15-second period
    - a. count either the contractions of the rib cage as the animal breathes, or
    - b. count the number of exhalations by holding the back of the hand close to the animal’s nostrils
  2. multiply this number by four to determine the number of breaths per minute
  3. animals should be restrained so they cannot walk away – keep them relaxed in a cool area to avoid panting – do not apply pressure to the chest
  4. report unusual sound to the doctor
    - a. rattling
    - b. sneezing
    - c. wheezing
    - d. groaning
  5. note unusual body positions to aid breathing, such as extension of the head
- F. Mucous Membranes (MM) – Observed when examining the oral cavity
1. normally moist and pink
  2. In sick animals
    - a. Dry or tacky
    - b. Color may vary from bright red to dark blue or purple
- G. Capillary refill time (CRT) – time it takes blood to refill capillaries – generally less than two seconds in healthy animals
1. briefly press finger against the gums forcing the blood out of the capillaries
  2. when finger is removed the area will appear blanche or white
  3. count the number of seconds it takes the blood to refill the capillaries
- H. Complete examination
1. Questions to ask owner
    - a. Has there been a change in appetite for food or water?
    - b. Has there been a loss of appetite?
    - c. Is there constipation or diarrhea?
    - d. Vomiting?
    - e. Has there been a change in the color, consistency, or amount of either urine or stool?
  2. Observe for ectoparasites – fleas, ticks, mange mites and ear mites
- I. Equipment
1. ophthalmoscopes – used to examine the eyes
  2. Oscopes – used to examine the ears

3. stethoscope – picks up body sounds in the chest and abdominal area
4. thermometers (glass or electric) – used to determine body temperature
5. microscope for studying slides
6. sink
7. centrifuge – to separate heavier particles in a solution from lighter particles
8. urinometer
9. autoclave
10. X-ray

### III. Care of Sick Animals

- A. Good general care is necessary for a speedy recovery
  1. follow the procedure for maintenance of kennels and cages
  2. maintain correct room temperature and ventilation
  3. supply fresh water and food daily
  4. food and water consumption may be noted
  5. give medication according to directions
  6. isolate large animals
- B. Special care may be required
  1. change dressing and bandages as necessary
  2. if anesthesia was used, the animal must be checked periodically
  3. maintain body heat with towels and incubators
  4. suture removal
    - a. set up a tray with the following supplies
      - (1) small scissors
      - (2) forceps
      - (3) cotton
      - (4) antiseptic
      - (5) dressings
    - b. gently clean the area with cotton saturated with antiseptic
    - c. snip the suture with small scissors
    - d. grasp the knotted end of the cut suture and pull

### IV. Animal Restraint

- A. Types of restraint
  1. Chemical restraint – involves the administration of tranquilizers, sedatives, or anesthetics
  2. Physical restraint – the manual control of an animal
    - a. physically holding the animal
    - b. use of halters and snares
- B. Tips for working with animals
  1. Avoid rough handling of animals during the hottest part of the day.
  2. Be cautious of the mother if you are working with her young.
  3. Do not chase swine over an extended period of time; this may cause animal fatality.
  4. Learn to be patient with animals
  5. Avoid startling or exciting the animal
  6. Never use any restraint method that interferes with an animal's breathing.
- C. Consider the work facilities

1. be certain the area is clean and it will provide good footing
  2. keep exits shut in case an animal should escape its handler
  3. have proper equipment clean and available in advance
  4. be aware of location and activities of others, especially the veterinarian or owner
- D. Restraint Equipment
1. Canine restraint
    - a. Muzzle – device used to prevent a dog from biting
    - b. Head snare – used to temporarily hold a dog by the head until further body restraint can be applied
    - c. Collar and leash – purchased commercially to restrain and lead dogs
  2. Equine restraints
    - a. Stanchion – a type of chute used to minimize the horse’s movement
    - b. Nose twitch – used to cause pain to the horse’s upper lip to divert the horse’s attention to the nose and away from the treatment being performed
    - c. Halter – a leather or nylon device placed around the muzzle and head of a horse to assist in restraint
    - d. Rope – usually placed around neck for restraint
    - e. Hobbles – leather or woven rope bands placed around horse’s legs to restrain the horse from kicking or running away. Another rope or chain is attached to the hobbles.
  3. Bovine restraint – like equine, the halter, stanchion and hobbles can be used
    - a. Nose tongs – applied to the animal’s nose septum to cause pain and divert animal’s attention from treatment
    - b. Nose ring – a metal ring permanently placed through the bull’s nasal septum. May be used to lead an animal.
    - c. Bull staff – a metal pole with a latch on the end which may be attached to the nose ring for better restraint
    - d. Electric stock prod – a battery-operated device with a probe at one end which delivers an electric shock
    - e. Squeeze chute – a device that holds and restrains the animal’s body; it consists of a headgate, tailgate, and a squeeze mechanism along the side of the chute
    - f. Headgate – a device used to catch the animal’s head as it is driven down a narrow passageway
  4. Swine restraint – like cattle, may be restrained by ropes and headgates
    - a. Hurdle – a lightweight wooden partition used to move pigs
    - b. Hog snare – a device used to catch and hold a large pig by its upper jaw and muzzle
- E. Restraining Animals – never allow the owner to hold or restrain the animal during a procedure or exam – this is a liability issue.
1. Dogs
    - a. When meeting a new dog, try to become acquainted by extending your hand, palm down, to allow the dog to smell it

- b. If the dog relaxes and begins sniffing hand and wagging its tail, scratch the dog behind the ears and then its back and body. Do not stare at the dog as this may be taken as an act of dominance
  - c. If the dog does not respond after a few attempts, the owner may be able to help by comforting the animal. The animal may have to be restrained – never allow the owner to restrain the animal during an examination.
  - d. Puppies may be carried using the scruff of the neck. Dogs may be transported by lifting and carrying with one arm around the dog's front legs and one arm around the posterior, grasping the hind legs.
  - e. For examination
    - (1) The dog is held on the table with one arm around the dog's neck and one around the posterior
    - (2) Injections other than IV can be given in this position
    - (3) For IV injections, the handler should hold the animal's head close and use the hand around the animal's posterior to hold the front leg in position.
  - f. To hold a large dog for examination
    - (1) Place one arm under the neck and grasp the foreleg opposite you
    - (2) Lean your body over the dog's shoulder while a second person holds the rear end.
2. cats
- a. hold onto the legs and feet and apply as little pressure as possible
    - (1) if a cat escapes it will find a hiding place
    - (2) may become aggressive when cornered
  - b. wear heavy leather gloves when handling aggressive cats
  - c. some can be restrained by simply holding them close to your body and allowing them to bury their head under your arm
  - d. Transportation
    - (1) Cat should be carried with one hand grasping the hind legs with a finger between the hocks and the other hand on the scruff of the neck
    - (2) Docile cats may be held close to the handler for better support
  - e. Injections and examinations – hold the cat on the table with the hands in the same position but with the animal stretched out
3. Restraining horses – horses are flight creatures and their primary defense mechanism is to run away
- a. To catch a horse
    - (1) Approach quietly and confidently on its left side
    - (2) Do not sneak up or walk directly behind a horse
    - (3) Say a few words quietly to let it know you are there
    - (4) Try to keep the halter hidden until you are within petting range
    - (5) Put a hand on the horse's shoulder and gradually work toward the head
    - (6) Slip a rope or halter around the horse's neck
    - (7) Slip the halter over the muzzle and buckle it
    - (8) A rope can be looped around the muzzle
  - b. For extra restraint use a twitch or hobble

4. Restraining Cattle – Usually requires the use of pens, head gates, and squeeze shoots to perform veterinary exams and treatments
  5. Restraining Pigs
    - a. On the side – the handler lifts the pig off the ground by one front leg and one back leg and places the pig on the ground on its side; the handler places his/her knees on the pig's back to minimize movement
    - b. By the front legs – the handler lifts the pig off the ground by its two front legs with its back toward the handler; lift legs higher and press against head for more control
    - c. By the hind legs – the handler lifts the pig off the ground by its two rear legs with its nose pointing down and its back against the handler's legs; squeeze pig between the handler's legs for more control.
- V. Disposal of Dead Animals
- A. Never dispose of any animal body without permission of the owner
  - B. Euthanasia is the act of ending life easily and mercifully – the veterinarian injects drugs into the animal to cause a speedy painless death
  - C. Some clients prefer to dispose of their pets, others prefer that the veterinarian dispose of the body
  - D. Proper disposal procedures must be followed for safety and sanitation
    1. place the body in a plastic bag to contain odors and body discharges
    2. follow state and local laws
      - a. small animals may be incinerated or buried
      - b. large animals may be taken to a city disposal pit, rendering plant or buried
    3. If a body must be kept over a period of time, it must be refrigerated or frozen horizontally
    4. Pet cemeteries are available to provide burial space
- VI. Shampoo and Dips
- A. Kinds of shampoo and dip
    1. medicated
    2. antibacterial
    3. antifungal
    4. parasiticide
    5. some dips are specific to one species of animal – some cattle dip will kill a dog
  - B. Warnings and labels
    1. read labels and follow manufacturer's directions exactly
    2. shampoos and dips that are too strong may cause irritation or death
    3. the animal should be watched for adverse reactions
  - C. Procedure for Bathing and Dipping
    1. brush the animal – this removes loose hair and caked mud, and allows the opportunity to look for parasites
    2. Apply ophthalmic ointment to animal's eyes to prevent irritation.
    3. Place animal in the bathing area and wet it completely with lukewarm water. Restrain by holding the nape of the neck with one hand and wash with the other hand.

4. When the animal is completely wet, apply shampoo to the head and down the back, keeping soap out of the eyes. Watch for external parasites that tend to migrate to the head for hiding in the mouth, nose or ears.
  5. Apply shampoo to the entire body.
  6. Rinse thoroughly with clean, luke-warm water.
  7. If a dip is to be used, it is poured or sponged over the animal, beginning at the head and working toward the tail.
  8. Dry by keeping in a warm area or using an electric dryer. Never tie an animal to a tub. (Remember cats do not enjoy being wet and express displeasure by scratching or biting. Handlers should protect themselves.)
- D. Procedure for dipping large animals (horses, cattle, swine)
1. Prepare prescribed shampoo and dip according to directions, and place close to the bathing area.
  2. Brush the animal to remove loose or matted hair, caked mud, dirt, or manure.
  3. Tie the animal in a wash pen or stanchion and gradually soak it with lukewarm water, beginning at the feet and legs and working up the body and increasing water pressure.
  4. Avoid spraying the head as much as possible. Hold the ears down to keep water out of them. Sponge the head, if necessary.
  5. Apply shampoo and lather completely.
  6. Rinse off all shampoo.
  7. Apply diluted dip by pouring or spraying over entire body.
  8. Allow animal to dry in an area free from drafts.
- VII. Nutrition – the veterinary technician will prepare rations and feed animals under the supervision of the veterinarian.
- A. The nutrient contained in food that provides the body with elements needed for metabolism
1. Water
    - a. Regulates body temperature
    - b. Transports nutrients throughout the body
    - c. Assists in chemical reactions
    - d. Lubricates and cushions joints and body organs
  2. Carbohydrates
    - a. Made of carbon, hydrogen, and oxygen
    - b. Are a source of energy
    - c. Convert to fat for storage in the body
  3. Lipids (Fats)
    - a. Made of carbon, hydrogen, and oxygen
    - b. Are a source of energy
    - c. Are a source of essential fatty acids
    - d. Are needed for utilization of fat-soluble vitamins – A, D, E, and K
  4. Proteins
    - a. Made of carbon, hydrogen, oxygen and nitrogen
    - b. Are needed for basic structure of collagen, keratin, blood, and elastin
    - c. Act as enzymes in metabolism
    - d. Are a source of energy

5. Minerals
  - a. Aid in formation and maintenance of bone
  - b. Nerve and muscle action
  - c. Regulate fluid balance
  - d. Assist in enzyme activity
  - e. Regulate acid-base ratio
6. Vitamins
  - a. Aid in bone formation
  - b. Assist in enzyme activity
  - c. Are needed for blood clotting
- B. Many factors influence the dietary needs of animals
  1. size of an animal
  2. age
    - a. developing bodies require smaller but more frequent feedings than the adult
    - b. adult animals require well-balanced rations
  3. working animals
  4. lactating females – require more water as well as more food
  5. temperament or behavior
  6. overall health of animal
- C. Dietary Needs of Canines
  1. most commercially prepared dog food meets daily nutritional requirements when fed in amounts suggested by manufacturer
  2. Adult dogs require about two to three percent of their body weight
  3. Dry puppy food moistened with water can be given to puppies as early as three weeks of age.
  4. An orphan puppy should be fed at least three to four times daily with ½ ounce of formula
  5. Dogs need two to three parts of water for each part of dry dog food
- D. Dietary needs of felines
  1. Adult cats need five to eight ounces of canned food or two to three ounces of dry cat food daily
  2. Dry cat food moistened to a soft consistency with warm milk or water can be given to kittens at about three weeks old
  3. Orphan kittens need to be fed formula four to five times daily
  4. Adult cats consume two to three parts water for each part of dry cat food
- E. Dietary Needs of Equines
  1. an adult horse that is not being worked or ridden can be maintained on a good pasture or hay alone.
  2. hay is fed at the rate of one to two pounds per 100 pounds of body weight
  3. young, old, lactating, gestating horses, worked or ridden horses require grain or supplemental feed added to the diet – usually one to two pounds per 100 pounds of body weight
  4. the average-sized horse will consume 10-14 gallons of water daily
- F. Dietary Needs of Bovines
  1. A good-quality pasture will provide most of the nutritional needs of cattle
  2. if green foliage is not available, add Vitamin A

3. Cattle fed dry harvested feeds will need about two to three percent of their body weight. Grain is fed at the rate of two pounds per 100 pounds of body weight
4. nutritional needs of calves are met if they have access to the dam's milk and the pasture or foliage she is fed.
5. Orphan calves should be placed on the following program
  - a. 1 to 3 days old – two to three pints of colostrums each morning and evening
  - b. 4 days to 3 weeks – four to six pints of milk each morning and evening
  - c. 3 to 4 weeks old – two to three pints of milk replacer and introduction to dry calf feed.
  - d. Calves can be weaned from milk as early as six to eight weeks and fed dry calf feed.
  - e. An adult cow will drink 10 to 14 gallons of water daily

#### G. Dietary Needs of Swine

1. the nutritional requirements for swine vary throughout the breeding season and reproductive cycle – the ration may vary from three to five pounds of a crude protein diet daily
2. small pigs can be weaned as early as three days and placed on a diet of synthetic milk – they are usually left to nurse, and are given pig starter ration at about three weeks. Weaning occurs at three to eight weeks
3. The average adult hog will consume 1 ½ to 3 gallons of water daily

### VIII. Administration of Drugs

A. Vaccination and other prophylactic drugs (i.e. antihelmintics) represent a large percentage of the medications sold and administered in most veterinary practices

#### B. Administering Medication

1. place tablets or capsules at the base of the tongue, hold the mouth closed with the head lifted, rub or stroke the throat to encourage swallowing
2. Large animals
  - a. Liquids are given to cattle by drenching or pouring into the mouth
  - b. The bovine's head is raised with the nose slightly above a plane parallel to the ground, the medication is squirted in the right side of the mouth on top of the tongue with a device called a drench gun
  - c. Dose syringes are used for horses and pigs
    - (1) Fill the syringe
    - (2) Place it with the nozzle in the corner of the animal's mouth, pointed towards the back of the tongue
    - (3) Squirt the medicine slowly
  - d. Boluses, capsules, or tablets are given to cattle with a balling gun
3. Topical medicines are applied externally whether the animal is small or large
4. Ophthalmic medicines are applied to the eyes
  - a. Rest one hand, holding the medicine, on the animal's head above the eye
  - b. Evert the lower eyelid with the thumb of the other hand, while also holding the jaw closed
  - c. Apply the medicine
5. Otic medicines are applied to the ears
  - a. Hold the ear flap up and slightly backward to expose the opening of the ear canal

- b. Fill a dropper with the medicine and insert it into the ear canal for a short distance
  - c. Put in a few drops and massage gently around the ear to move the medicine into the ear canal
  - d. Wipe away excess medicine with cotton sponges
6. Both small and large animals are given injections in the same way
- a. Subcutaneous injections
    - (1) pick up the skin between your thumb and forefinger
    - (2) insert the needle, at a 45-degree angle to the surface of the skin, just beneath the upheld skin
    - (3) drive the needle completely through the skin (approximately half of the needle should remain visible).
    - (4) Depress the plunger. There should be little or no resistance to flow. If there is considerable resistance, redirect the needle
  - b. Intramuscular injections
    - (1) Follow the same procedure for subcutaneous
    - (2) Except, insert the needle into the muscle at a 90 degree angle to the surface of the skin
    - (3) Common sites include the large muscles of the rear limbs, neck, and shoulders – all injections on cattle should be given in the neck due to tissue damage in relation to slaughter animals.
    - (4) Once in place, the plunger is slightly withdrawn to determine whether or not the needle as accidentally entered a vessel. If blood enters the syringe, the needle has entered a vessel and should be withdrawn and reinserted before injecting any medication
  - c. Intravenous injections – much more difficult to administer and should only be done by experienced veterinary technicians
    - (1) Most common site for giving in small animals is the cephalic vein in the front legs
    - (2) In large animals – the jugular vein
    - (3) Before giving an IV injection, make sure there are no air bubbles in the syringe
    - (4) With one hand, occlude the vein at a point proximal from the injection site.
    - (5) Allow the vein to fill with blood. (You should be able to watch it rise as it fills.)
    - (6) In one smooth motion, thrust the needle through the skin and into the vein.
    - (7) Make sure the needle is in the vein by withdrawing the plunger slightly. The syringe should begin to fill with dark red blood. Bright red blood means you are in an artery. Intra-arterial injection of certain medications can be fatal.
    - (8) Inject half of the medication and withdraw the plunger again to make sure the needle is still in the vein.
    - (9) Inject the remaining medication
    - (10) Fully depress the needle
    - (11) In one smooth motion, remove the needle and press your finger over the site for a few seconds to prevent bleeding.

7. following any type of injection, proper disposal of the needle in a medical waste container is mandatory.
- IX. Diagnostic Procedures – diagnosing animal disease and prescribing treatment can only be done by a veterinarian, assisting with that process is the responsibility of the veterinary technician.
- A. Radiology – the branch of science that deals with using X-rays for diagnosing and treating disease.
1. X-rays are invisible electromagnetic radiations with a short wavelength capable of penetrating opaque or solid substances and tissues
  2. Radiographs are the films (or actual pictures) produced using X-rays
    - a. A gelatin sheet covered with silver halide crystals that are sensitive to electromagnetic radiation
    - b. Must be labeled and identified correctly
      - (1) Labels must include the name of the veterinary clinic and the patient's ID number or name
      - (2) Specific body part pictured should be identified
        - Lead letters are attached to signify if the X-ray is the right or left
        - (a) "R" – right
        - (b) "L" – left
        - (c) "RR" – right rear
        - (d) "LR" – left rear
  3. Safety procedures when taking radiographs
    - a. Only necessary people should be in the room during radiographic procedures
    - b. Every person in the room must wear a lead apron
    - c. The person holding the animal or cassette must wear lead gloves
    - d. No part of the body should be placed in the direct path of the X-ray beam
    - e. Females – if any possibility of pregnancy avoid taking radiographs- alert supervisor
  4. Radiographs are developed by two methods
    - a. Automatically – involves the use of an automatic film developer machine, similar to the machine a one-hour photo shop might use
    - b. Manually
      - (1) The exposed cassette must be unloaded in a darkroom
      - (2) The film is submerged in developing solution for a short period of time
      - (3) The film is placed in a rinsing solution or water
      - (4) The film is submerged in fixing solution
      - (5) The film is washed with water and dried
- B. Hematology – the study of blood
1. Components of blood
    - a. fluid
      - (1) plasma is a complex fluid containing nutrients, hormones, enzymes, fibrinogen, antibodies and other chemical substances.
      - (2) Serum – the fluid part of blood minus the clotting factors.
    - b. Formed Elements
      - (1) Erythrocytes
        - (a) Make up 30 to 50 percent of the blood

- (b) Have a biconcave shape
- (c) Lack a nucleus in the mature form
- (d) Contain hemoglobin (gives cells red color) that allows the cells to transport oxygen and carbon dioxide
- (2) Thrombocytes (platelets)
  - (a) Aid in the clotting of blood
  - (b) Formed from remnants of large cells called megakaryocytes, after these disintegrate
  - (c) Platelets are the smallest organized bodies in the blood
- (3) Leukocytes (white cells)
  - (a) Not as numerous as the red cells
  - (b) Divided into five types

### C. Blood Collection

1. sites for collection
  - a. small animals,
    - (1) the cephalic veins, located on the dorsal side of the forelimb
    - (2) saphenous veins, found on the lateral side of the hind leg
  - b. for puppies and kittens – clip a toenail down to the nail bed
  - c. large animals – one of the jugular veins located in the neck on either side of the trachea
  - d. Specific animals
    - (1) cattle – coccygeal vein, found on the ventral side of the tail
    - (2) swine and rodents – veins found in the margins of the ears
    - (3) pigs – anterior vena cava, a major vein leading directly into the heart
2. blood is usually obtained from the animal's vein using a needle and syringe
3. steps for blood collection
  - a. once a site has been chosen, assemble the equipment needed for collection
    - (1) secure a needle and syringe or vacutainer and holder
      - (a) a 20 gauge needle is used for small animals
      - (b) an 18 gauge needle is used for large animals
    - (2) provide alcohol sponges and dry sponges
    - (3) if white blood is needed, tubes containing an anticoagulant may be used – KEDTA (potassium ethylene diamine tetracetic acid)
  - b. restrain the animal
  - c. clean the collection site with alcohol
  - d. place some type of constriction above the site (between the site and heart) to cause the vein to stand out – use your hand or some type of band
  - e. insert the needle through the skin and into the lumen of the vein
  - f. pull back on the plunger to fill the syringe
  - g. withdraw the needle and apply pressure with a dry sponge to stop bleeding

### D. Blood Tests and Blood Smears

1. blood can be analyzed using several diagnostic procedures
  - a. packed cell volume (PCV) – determines the percentage of erythrocytes in the blood
    - (1) blood must be placed into a micro-hematocrit tube and sealed at one end

- (2) it is then centrifuged for several minutes to separate the blood cells from the plasma
- (3) the heavier blood cells are “packed” at the bottom of the micro-hemocrit tube
- (4) the sample is applied to a chart to determine the PCV
- b. Total protein (TP) – uses an instrument called a refractometer to determine the protein content of the plasma after it has been centrifuged
- c. White Blood Count (WBC) – uses a microscope and hemocytometer to determine the percentage of leukocytes in the blood
- d. Complete Blood Count (CBC) – uses a microscope and hemocytometer, or an automatic cell-counting machine, to count the number and type of cells in the blood - Includes an erythrocyte count, a leukocyte count and a differential count
- e. Colorimetric test can be used if a more accurate hemoglobin determination is needed. This test compares the animal’s blood to a color standard for a known amount of hemoglobin
- f. Bleeding tests are done to determine whether an animal’s blood will coagulate or clot in a normal length of time
  - (1) A stab wound is made aseptically in a hairless area
  - (2) The blood is blotted with a filter paper at 30-second intervals until the blood clots
  - (3) The length of time required is noted
  - (4) Normal time varies from one to five minutes
  - (5) Abnormal bleeding time may indicate disease
- g. Blood chemistry tests diagnose which organs – such as the kidney or liver – have not been functioning properly and to follow the progress of treatment.
  - (1) Equipment required
    - (a) Centrifuge to separate blood serum or plasma
    - (b) Test tubes and pipettes
    - (c) Kits containing all necessary reagents are also available – dip sticks, tapes and reagent pills may be used
- h. Extensive chemical tests may be necessary for diagnosis – serum is collected and sent to a central laboratory requesting a panel of tests
- i. Serum may be tested for the presence of specific antibodies by agglutination (clumping) or precipitation when an antigen is added.
- j. Immunodiffusion serological tests show precipitation in a gel medium when an antigen-antibody reaction occurs (ex. Coggins Test for infectious equine anemia)
- k. A direct smear to diagnose heartworms
  - (1) Heartworms produce thousands of infective larvae (microfilariae) that inhibit the circulatory system of dogs and rarely cats.
  - (2) The animals are infected by the bite of a mosquito carrying a parasite– as the mosquito feeds on the animal, it injects parasites from its own body into the bloodstream of the victim.
  - (3) Technique 1
    - (a) a smear is made from fresh blood of the animal
    - (b) The blood is centrifuged
    - (c) A drop of sediment is placed in a drop of saline on a slide and examined for the presence of heartworms

- (4) Technique 2
  - (a) Heparinized blood in capillary tubes is sealed and centrifuged
  - (b) The buffy coat is examined under the low-power objective for heartworm migrating out into the plasma
- (5) Technique 3 – Stained specimen
  - (a) Mix venous blood with 2% buffered formalin in a one to ten dilution
  - (b) Centrifuge and decant supernatant
  - (c) Stain sediment with methylene blue stain for microscopic examination
- (6) Technique 4
  - (a) use a filter placed in a cup-shaped holder
  - (b) filter fresh blood through
  - (c) add stain to the filter paper and examine for heartworms
- l. Ehrlichiosis, a rickettsial disease carried by ticks to dogs and horses may be diagnosed from blood smears – colonies of coccoid bodies appear within the cytoplasm of the white blood cells, usually the neutrophils
- m. Hemobartonella causes a rickettsial disease in cats leading to infectious anemia. Hemobartonella invades the red blood cells, appearing as small inclusions on blood smears stained with Wright's or Giemsa's stain
- n. Anthrax can be identified from blood smears stained with polychrome methylene blue or Giemsa's stain. Microscopic examination demonstrates an encapsulated bacillus
- 2. Techniques to be followed when collecting and handling blood
  - a. Blood should not be mixed vigorously as this can lead to hemolysis (rupture of erythrocytes allowing hemoglobin to leak into the plasma).
  - b. Analysis done in the clinic should be performed promptly. If possible, all chemical measurements should be completed within one hour of collection.
  - c. Do not let a sample become too warm. Heat can cause the deactivation of some chemicals and an increase in enzyme activity.
  - d. Label blood tubes with the patient's name or ID number
- E. Fecal Examinations – veterinarians examine feces for signs of parasites
  - 1. Collecting feces
    - a. Make sure the sample is fresh
    - b. Place the sample in a specimen cup or clean container
    - c. If not examined immediately, refrigerate
  - 2. Examination Procedures
    - a. Gross examination – the observation of fecal material.
      - Note the following
      - (1) Color
      - (2) Consistency
      - (3) Presence of blood
      - (4) Presence of feed material
      - (5) Presence of parasites
    - b. Direct Smear
      - (1) mix the feces with water or saline
      - (2) place a drop of the solution on a microscope slide
      - (3) observe the sample with a microscope for parasitic worms, eggs, and cysts

- c. Fecal flotation – based on the concept of specific gravity (the weight of an object compared to the weight of an equal volume of water).
  - (1) Parasitic eggs generally have a specific gravity (approx 1.1 g/ml) that is slightly heavier than the specific gravity of water (1.0 g/ml).
  - (2) Flotation solutions have a specific gravity of about (1.25 g/ml), which causes the parasite eggs and other life stage to float and fecal debris to sink to the bottom

## X. Disinfection Procedures

### A. Chemical Disinfections

1. chemicals kill microorganisms by coagulating their protein
2. new germicidal and virocidal cleaners are now on the market that can be depended upon to actually rid surfaces 100%
3. follow manufacturer's directions exactly for diluting chemical disinfectants or secure solutions that are ready to use
4. alcohol is frequently used to disinfect hinged instruments and glass thermometers. Place equipment in a 70 percent solution of ethyl or isopropyl alcohol for 30 minutes
5. some veterinary hospitals store clean instruments in covered containers of disinfectants called a cold pack – these instruments can only be used for minor procedures because sterility cannot be guaranteed.
6. halogens are a group of chemicals used to kill pathogens
  - a. chlorine
    - (1) used as a disinfectant in water supplies and sewage
    - (2) chlorine preparations serve as disinfectants for glassware, water containers, and kennel areas
    - (3) an oxidizing agent
    - (4) destructive to tissue when inhaled as a gas or contacted in concentrated form
  - b. iodine
    - (1) placed in antiseptics at a two percent to three percent solution
    - (2) for use on skin surfaces
    - (3) for use for instrument soaking solutions
7. Hydrogen peroxide, in three percent solution
  - a. Used to wash and clean wounds
  - b. An oxidizing agent
8. hexachlorophene – a phenol derivative used in detergents for cleaning skin surfaces
9. chlorhexidene (Nolvasan) – used as a disinfectant for cleaning tabletops and soaking instruments
10. Alkalis – used as germicides in pens and stalls
  - a. Sodium hydroxide (lye)
  - b. Calcium oxide (unslaked lime or quicklime)

### B. Heat Sterilization

1. an autoclave produces moist heat by using steam under pressure – unwrapped instruments, glassware, and wrapped packs may be autoclaved
  - a. Before using an autoclave,
    - (1) check to see whether reservoir tank is filled with water to the proper level
    - (2) set controls to vent as soon as sterilization time is complete

- (3) make sure the temperature and pressure gauges are on zero before opening the doors
    - b. Five basic steps
      - (1) Fill: add a specific amount of distilled water to the inside chamber
      - (2) Load: place items to be sterilized inside the chamber, close and lock the door.
      - (3) Regulate: set the temperature and the timer to begin sterilization.
      - (4) Vent: at the end of the sterilization period, switch the controls to vent, allowing the temperature and pressure to drop.
      - (5) Dry: when temperature and pressure return to zero, open the door to allow sterilized items to dry
    - c. Do not crowd items in autoclave or allow them to touch the sides
    - d. Use gloves, padded holders, or tongs to remove items from the chamber
  - 2. hot air sterilizers produce dry heat for items that must remain dry
  - 3. in certain situations, metal instruments may be sterilized by passing them through the flame of a burner.
  - 4. instruments may also be placed in a container, covered with water, and boiled for 15 minutes to render them sterile.
  - 5. Gases (ethylene oxide) – used to sterilize surgical supplies that cannot survive autoclaving
  - 6. Ozone sterilization is a new technique that is being watched closely
- C. Surgical Equipment and Packs
- 1. Guidelines for preparing sterile packs
    - a. Select instruments by the type of surgery to be performed
    - b. Obtain surgical tray
    - c. Before placing any instrument in a pack, be certain it is clean and in working condition
    - d. Arrange instruments in the order of their use.
    - e. Stack gauze squares on the tray.
    - f. Place the covered tray diagonally on a surgical wrap and fold over the corners, covering the tray completely
    - g. Place the unwrapped pack diagonally in the middle of a large sheet of wrapping paper
    - h. Fold the corners over in the same manner as the surgical wrap
    - i. Seal with autoclave tape and label with the type of pack and the initial of the person preparing the pack
    - j. Place in the autoclave – be sure the packs have some type of indicator that changes color when the proper temperature has been maintained
  - 2. Packs may be set up for any surgical procedure
    - a. Spaying packs for either dogs or cats
    - b. Neutering packs
    - c. Ear-trim packs
    - d. Tumor removal packs
    - e. Eye packs
    - f. Bone surgery packs
  - 3. tray preparation will vary from office to office and doctor to doctor

4. surgical instruments are delicate – they should be handled with care and only used for the tasks for which they were designed
- D. The Microscope– veterinary technicians must be accustomed to using a microscope in order to do blood counts and identify parasites and their ova from fecal or blood smears

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## ACTIVITIES

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- I. Complete Taking an Animal's Pulse Rate.
- II. Complete Taking an Animal's Respiration Rate.
- III. Complete Applying a Bandage.
- IV. Complete Reading a Thermometer.
- V. Complete Taking and Animal's Temperature.
- VI. Complete Use of the Autoclave.

### **Teacher Note**

Some of the other procedures listed in the Key Points Section can be developed into activities. This lesson has the capability to be separated into various lessons.

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## MATERIALS NEEDED

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An animal (a docile dog is preferred)  
clock or watch with a second hand  
Roll of gauze bandaging  
Roll of adhesive tape  
Bandage scissors  
Oral thermometer  
Alcohol  
Clock or watch  
Watch with a sweep second hand  
Rectal glass thermometer  
Vaseline or other lubricant  
Wipes  
Digital electronic thermometer with probe  
Probe covers  
Autoclave  
Any item that may be safely autoclaved (such as fabric, metal, or glass)  
Wrapping paper (such as butcher's paper or plain white shelf paper)  
Distilled water  
Autoclave tape or strips  
Clinical Assistance Test Key  
Mercury Thermometer Information

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## ASSESSMENT

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Clinical Assistance Test

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## **ACCOMMODATIONS**

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For reinforcement, the student will list the procedure steps and redo.

For enrichment, the student will interview a zoo veterinarian on how these procedures are performed on exotic animals. Report findings.

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## **REFLECTIONS**

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## **Taking an Animal's Pulse Rate**

**Objective:** To practice taking an animal's pulse rate.

**Materials:** An animal (a docile dog is preferred)  
A clock or watch with a second hand

**Directions:** Use this procedure to take an animal's pulse.

1. Palpate the femoral artery of a small animal and the manibular artery in a large animal.
2. Once the pulse is felt, count the number of heartbeats (pulses) that are felt in one minute.
3. Record the results.
4. If possible, take the pulse rate of both young and old animals. You will find that the pulse rate decreases with age.

## **Taking an Animal's Respiration Rate**

**Objective:** To take an animal's respiration rate.

**Materials:** An animal (a docile dog is preferred)  
A clock or watch with a second hand

**Directions:** Follow this procedure to check respiration rate.

1. Keep the dog as quiet and calm as possible.
2. Observe the dog, and count the times it breathes in one minute.
3. Record the results.
4. Exercise the dog by running it for a few minutes.
5. Then observe the dog and count the number of times it breathes in one minute.
6. Record the results.
7. If possible, take the respiration rate of both young and old animals. Record the results.

## **Applying a Bandage**

**Objective:** To learn to apply a simple bandage to a leg.

**Materials:** Roll of gauze bandaging  
Roll of adhesive tape  
Bandage scissors

**Directions:** Students may practice on a docile dog or, if an animal is not available, they may practice on each other.

1. Assemble gauze bandaging, bandage scissors, and adhesive tape.
2. Tear off appropriate strips of adhesive tape, and stick one end of each strip to a clean, dry surface, such as tile or glass, where you can reach it easily.
3. Hold the roll of bandaging in one hand.
4. Cup the palm of your hand to hold the roll, and place your thumb against the roll to control it. (Bandage rolls have a tendency to roll right out of your hand!)
5. Control the rate at which the bandage unrolls with your thumb.
6. To begin bandaging, hold the end of the bandage in place, and wrap over the end two to three times to secure it.
7. Wind the bandage around the leg, overlapping each layer about two-thirds above the preceding layer.
8. Make half-twists, always in the same direction, at intervals to fit the bandage to the limb.
9. When the area is completely bandaged, cut or tear the gauze lengthwise, and tie a knot to prevent further tearing. Then wrap the two ends like a shoelace, and tie.
10. Secure the bandage with adhesive tape. (Use self-adhering tape if possible to avoid pain to the animal when the bandage is removed.)

## **Reading a Thermometer**

**Objective:** To read the temperature on a thermometer.

**Materials:** Oral thermometer  
Alcohol  
Clock or watch

**Directions:** Follow this procedure to read a thermometer.

1. Shake the mercury down in the thermometer.
2. Place the thermometer under your tongue for 3 minutes.
3. Remove the thermometer, and hold it so the numbers are facing you. Rotate it back and forth until you see the mercury line, and then take your reading.
4. Have the instructor approve your results.
5. Shake the mercury down again, and wipe the thermometer clean with the alcohol.

Allow it to dry.

6. Repeat step 2, but use different time intervals. This will give you different readings for practice.
7. Practice the above steps until you have no difficulty reading a thermometer.

## **Taking an Animal's Temperature**

**Objective:** To practice taking an animal's temperature.

**Materials:** An animal (docile dog is preferred)  
Assistant  
Watch with a sweep second hand  
Rectal glass thermometer  
Vaseline or other lubricant  
Wipes  
Digital electronic thermometer with probe  
Probe covers

**Directions:** Follow this procedure to take temperature.

A. For glass rectal thermometer, proceed as follows:

1. If needed, have someone restrain the animal.
2. Shake down the mercury in the thermometer.
3. Apply lubricant to bulb end of the thermometer.
4. Insert the thermometer into the animal's rectum about 1 inch.
5. Wait for three minutes while continuing to hold the thermometer by the stem end.
6. Remove, wipe clean, read, and record results.

B. For digital electronic thermometer, proceed as follows:

1. Remove probe from stored position.
2. Insert it into a probe cover.
3. Insert the covered probe into the animal's rectum about 1/2 inch.
4. Hold the probe until the buzzer sounds.
5. Remove the probe.
6. Read and record temperature.
7. Discard probe cover and return probe to its stored position.

## Use of the Autoclave

**Objective:** To learn the procedure for safely and successfully sterilizing items in an autoclave.

**Materials:** Autoclave  
Any item that may be safely autoclaved (such as fabric, metal, or glass)  
Wrapping paper (such as butcher's paper or plain white shelf paper)  
Distilled water  
Autoclave tape or strips

**Directions:** This procedure may be done at work and reported to the instructor or carried out within a classroom furnished with an autoclave. If done at work, follow instructions for that equipment exactly.

1. Wrap the item to be autoclaved.
2. Place the autoclave tape or strips where they are clearly visible on the wrapping.
3. Check the water reserve tank on the autoclave. If the water is below the full line, add the appropriate amount of distilled water.
4. Fill the autoclave chamber with distilled water to the water level line.
5. Set the required temperature and time.
6. Place the wrapped item on the shelf in the chamber of the autoclave.
7. Shut and latch the door closed.
8. Turn the autoclave control dial to "sterilization."
9. When the sterilization time is complete, turn the autoclave control dial to "vent."
10. When the temperature and pressure gauges are on zero, carefully open the chamber door. **Caution:** Avoid the hot steam that escapes when the door is first opened.
11. Allow the item to cool with the autoclave door open (about 15 to 20 minutes).
12. Remove the item, and check the autoclave tape or strip for a color change.
13. Record any difficulties or questions you may have, and turn them in to the instructor.

## **Test / Chapter 5 Clinical Assistance**

*Directions: Complete these questions using brief answers.*

1. List and explain the essential parts of a complete patient history.
2. List what is included in an animal's physical examination.
3. What is the most commonly used vital sign in a veterinary practice? What does it indicate?
4. How does a technician take the respiration of an animal?
5. In sick animals, what are the usual characteristics of the mucous membranes?
6. Describe good management procedures in caring for sick animals, including food, bedding, and living space?
7. Describe what a twitch is and how it works.
8. Describe where a handler's hands are placed when transporting a cat and a dog.
9. Name devices used to restrain cattle—either dairy or beef.
10. Give four reasons for bathing animals.
11. Why do veterinary technicians apply ophthalmic ointment to an animal's eye when preparing to bath it?
12. Why should the veterinarian be notified immediately if an animal seems to react unduly when bathed or dipped?
13. In preparing for a bath, why are animals brushed?

14. List factors that influence the dietary needs of animals?
15. Where are topical medicines applied?
16. Where are subcutaneous injections made?
17. What are common sites for intramuscular injections?
18. Name the sites that are ordinarily used for IV injections in small animals and in large animals.
19. Give three examples of diagnostic procedures used in veterinary medicine.
20. Why are blood tests done?
21. Choose one of the following and define (a) PCV, (b) total protein, (c) WBC, and (d) CBC.
22. What three tests are included in a complete blood count?
23. What are blood chemistry tests used for?
24. Name four diseases that may be diagnosed from direct smears.
25. What is ehrlichiosis?
26. List an important point to remember when working with blood.
27. Why do veterinarians examine feces?

28. What does the term sterile mean? What are the two basic methods for sterilizing surgical equipment?
29. Describe how to prepare instruments for sterilization.
30. Alcohol is used to disinfect what?
31. What is the autoclave used for?
32. Describe how to prepare a surgical pack for sterilization.

Directions: Calculate the proper amount of food and water to provide for animals.

33. A dog weighs 30 lbs. Using percentages suggested in this section, calculate how much feed might be given on a day that the dog went hunting. [Use 2.5 percent of body weight and 2.5 X(times) more food.]  
Calculate the average amount of feed on a day when the dog stayed in the kennel.  
What amount of water for each part dry food is suggested for canines?  
How many times during the day are puppies fed?
34. How much canned food is needed by adult cats daily?  
How much dry food is needed by adult cats daily?  
What amount of water for each part dry cat food is suggested for felines?  
How many times during the day are kittens fed?
35. A horse weighs 1,500 pounds. It will be ridden on a trail drive. Figuring two pounds of hay per 100 pounds of body weight, calculate how much hay to feed it.  
If the trail drive extends over several days, calculate how much supplemental feed to add.  
How much water will an average-sized horse consume daily?
36. Grain is fed to cattle at a rate of two pounds per 100 pounds of body weight. How much grain is given to a 500 lb. steer?  
At what age are orphan calves first introduced to dry food?  
At what age are orphan calves weaned?  
How much water will an adult cow drink daily?
37. How much feed is given each pig daily?  
How early may piglets be weaned?  
When are piglets usually weaned?  
How much water does an adult hog consume daily?