

Welcome to Pothole, New Mexico in rural Sagebrush County. Sagebrush County is home to a variety of agriculture and animal related industries. There is a large population of cattle due to a strong cow/calf ranching tradition, a beef feedlot and two dairies. There are two purebred horse farms and rodeo, gymkhana, and a lot of people who enjoy western and English riding mean a lot of horses need health care. There is a goat dairy and two meat goat ranchers in the county. There are two sheep ranches, raising mutton and wool. A large confinement pig operation moved in about a year ago, and just last month, a large corporate poultry company finished building facilities for layers, meat chickens, and turkeys. Most people in the county own dogs and cats, not to mention rabbits, birds and reptiles. You can see that a veterinarian in this county will have plenty of work and see a wide range of species and diseases. Let me introduce you to George Tietbaum, DVM. He has been practicing for many years, and would like to hire some help. This is where you come in. Doc put out an ad for help, and congratulations, you got the job! Over the next few months you will have to opportunity to ride with Dr. Tietbaum as he serves the animals and people of Sagebrush County from his clinic in Pothole and from his mobile unit. You will get a new scenario to face about once a month. Enjoy this introduction to veterinary medicine and the math involved in treating sick animals.

Today, like most days, you are cleaning kennels. For once you are glad to be inside because it has been a hot, dry August and the flies have been driving everyone crazy. The phone rings and you answer the phone for Dr. Tietbaum. John Eisore, who has a purebred Hereford operation, is on the other end of the line. He tells you that he needs the doc to come out to his place. He has a bunch of calves with runny, squinty eyes. At first he thought the problem was due to the dusty conditions in the pens he has the calves in, but now he is getting worried. He tells you he has one calf with an eye that has turned blue. He is afraid his calves are poisoned and going blind. You and Dr. Tietbaum head out to the ranch.

Doc looks at several calves and diagnoses Infectious Bovine Keratoconjunctivitis (IBK), also known as Pinkeye. The hot weather and dusty conditions of the pen along with the high population of face flies has set up a perfect environment for the disease. The bacteria that causes IBK – *Moraxella bovis* – takes advantage of damage to the cornea. The dust, the intense August sunshine, and the face flies that scratch the cornea and spread the bacteria have given the disease a great start in the Eisore herd.

Now it is time to start getting this outbreak under control. You help Mr. Eisore bring the calves up to the chute. There are 25 calves, and they all weigh between 200 and 250 pounds. Dr. Tietbaum will examine each animal in the chute and treat them according to the severity of the disease in each case. Early stage cases will be given a dose of an antibiotic called Keratomycin. The antibiotic is dosed at 22 mg / kg and is supplied at a concentration of 300 mg / ml to be administered IM. The antibiotic comes in 50 ml vials. Doc will use an average weight of the calves to determine a dose.

1. What is the average weight of these calves?
 - A. 180 lb
 - B. 200 lb
 - C. 225 lb
 - D. 250 lb

$$\frac{200 + 250}{2} = 225$$

2. How will the Keratomycin antibiotic be administered?
 - A. By mouth (IM means "in mouth")

- B. By injection under the skin (IM means “into membrane”)
- C. By topical application in the eye (IM means “intramucosa”)
- D. By injection into the muscle (IM means “intramuscular”)

3. What is the average weight converted to kg?

- A. 102.3 kg
 - B. 114.2 kg
 - C. 91.6 kg
 - D. You cannot convert lb to kg because pounds are American units and kilograms are metric units.
- $$225 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = 102.3 \text{ kg}$$

4. What is the proper dose for the average size calf in mg?

- A. 22.5 mg
- B. 2250 mg
- C. 7.5 mg
- D. 75 mg

$$102.3 \text{ kg} \times \frac{22 \text{ mg}}{\text{kg}} = 2250 \text{ mg}$$

5. How many ml of Keratomycin will each early stage calf be given?

- A. 22.5 ml
- B. 2250 ml
- C. 7.5 ml
- D. 75 ml

$$2250 \text{ mg} \times \frac{1 \text{ ml}}{300 \text{ mg}} = 7.5 \text{ ml}$$

Dr. Tietbaum follows this treatment protocol for most of the calves since Mr. Eisore caught the outbreak early. Two of the calves however are in a more severe stage of the disease. Both these calves have ulcers on their eyes and will require more intense therapy. To treat these calves Doc will inject another antibiotic directly into the conjunctiva (the membrane that lines the inside of the eyelid), then apply an eye patch to protect the eye while it heals. Both these calves will also receive the same dose of Keratomycin that the other calves received.

Now the calves are treated, but it is important to prevent new infections by addressing initiating factors. Remember, if the cornea is not damaged, the bacteria cannot cause disease. The radiation from the sun, the blowing dust and the face flies that scratch the eye AND spread the bacteria from calf to calf all damage the eye to let the bacteria do its damage. Doc suggests moving the calves to a pen that has some shade in it, and to spray the pen with water regularly to keep the dust down. There is not much more a guy can do about the elements. The flies however can be addressed with an insecticide. Doc uses a spray called Muscaway that can be used on the calves or as a premise spray. Muscaway is supplied as a concentrate in a 1 L bottle. The directions say to mix 3 ounces of the chemical in 5 gallons of water to make a spray that can be used on the calves and the premises.

6. The measuring cup for the concentrate is missing, but you have syringes you can measure the concentrate with in ml. How many ml in 3 ounces?

- A. 9 ml
- B. 90 ml
- C. 900 ml
- D. Remember, you cannot convert an American unit to a metric unit.

$$3 \text{ oz} \times \frac{30 \text{ ml}}{1 \text{ oz}} = 90 \text{ ml}$$

7. Mr. Eisore has a 3 gallon sprayer he will use to spray the calves. How many ml of Muscaway should you add to the 3 gallons of water?
- A. 1.8 ml
 - B. 9 ml
 - C. 54 ml
 - D. 90 ml

$$\frac{3 \text{ oz}}{5 \text{ gal}} = \frac{90 \text{ ml}}{5 \text{ gal}} = \frac{18 \text{ ml}}{1 \text{ gal}} \text{ and so } 3 \text{ gal} \times \frac{18 \text{ ml}}{1 \text{ gal}} = 54 \text{ ml}$$

8. Mr. Eisore will use a trailer mounted spray applicator to spray the pens and around the barn. The tank on the applicator has a capacity of 500 gallons. How many bottles of Muscaway will he add to 500 gallons of water?
- A. 3 bottles
 - B. 9 bottles
 - C. 30 bottles
 - D. 90 bottles

$$500 \text{ gal} \times \frac{18 \text{ ml}}{1 \text{ gal}} \times \frac{1 \text{ L}}{1000 \text{ ml}} \times \frac{1 \text{ bottle}}{1 \text{ L}} = 9 \text{ bottles}$$

On the way back to the clinic Dr. Tietbaum asks you to start thinking about the charges for the call. He tells you that Keratomycin costs \$25.50 per vial. The last vial opened will still have some Keratomycin left in it, but doc left the bottle at the ranch so Mr. Eisore can follow up with further treatment as needed on refractory cases.

9. How many vials of Keratomycin will be charged to Mr. Eisore?
- A. 1
 - B. 2
 - C. 3
 - D. 4

$$25 \text{ doses} \times \frac{7.5 \text{ ml}}{\text{dose}} \times \frac{1 \text{ vial}}{50 \text{ ml}} = 3.75 \text{ vials injected. Three full vials used. Left over left with Mr. Eisore.}$$

4 vials charged to Mr. Eisore.

10. How much did Mr. Eisore spend on the Keratomycin?
- A. \$25.50

- B. \$95.63
- C. \$102.00
- D. \$191.25

$$4 \text{ vials} \times \underline{\$25.50} = \$102.00$$

vial