UNIT IV - ANIMAL HEALTH

Lesson 1: Importance of Animal Health

Objective: The student will be able to understand the significance of animal health in livestock.

Study Questions

1. **Identify careers in animal health.**
2. **What is the economic importance of animal health?**
3. **How are drugs approved?**
4. **What are differences between population and individual medications?**
5. **What are government health regulations for movement of livestock interstate and intrastate?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 1: Importance of Animal Health

TEACHING PROCEDURES

A. Review

B. Motivation

What are the annual costs associated with animal health? What does animal health (or sickness) cost the average livestock producer? A whopping $11 billion is lost every year due to animal health problems, costing the average livestock producer 15 percent of annual cash receipts. Animal health is a large factor in the profit or loss of a livestock operation.

C. Assignment

D. Supervised study

E. Discussion

1. Ask students if they know what occupations are associated with livestock health and the educational background needed.

   Identify careers in animal health.

   a) Veterinarian - This occupation is involved with many aspects of livestock health. These include vaccinations, setting up health programs, deworming, curing sick or unhealthy animals, and detecting livestock diseases.
   b) Livestock producer - If they have the facilities, livestock producers do most of the on-farm vaccinations and treatments. Livestock producers also detect and observe diseases that affect their herds.
   c) Extension livestock health specialist - The Extension Service provides information about animal health programs. It provides health, sanitation, and prevention programs to producers.
   d) Animal health products representative - An animal health sales rep sells equipment, medicine, and necessary tools for administering on-farm vaccinations.
   e) Livestock health scientists - These scientists provide the latest research for new cures and detection of new diseases. They work at major universities, the USDA, and in industry.
   f) Animal health enforcement - People in this occupation enforce state or national regulations regarding animal transportation, quarantines, and health certificates. They also monitor for new livestock diseases to keep them from entering the country.

2. Ask students how animal health affects the profit or loss of a livestock operation. How could a livestock operation benefit from a health program or preventive measures?

   What is the economic importance of animal health?

   a) There are billions of dollars lost every year because of poor animal health. Approximately 15 percent of all producer cash receipts in a year are used to cover losses caused by diseases associated with animal health. This 15 percent translates into $11 billion lost annually.

b) The following items occur every year and determine profit or loss for a livestock producer.
   1) Approximately 12 percent of cows bred never calve due to diseases, which cause cows to abort the fetus, and general health or nutrition problems, which prevent or hinder conception.
   2) Approximately 6 percent of all calves die between birth and weaning because of general health and/or nutrition problems.
   3) About 10 percent of all calves are afflicted with scours; about 18 percent of dairy calves afflicted with scours die.
   4) Cow-calf operators spend approximately $26.95 per cow on disease prevention and death losses.
   5) Approximately 1.5 million cattle are lost in the feedlot due to general health problems, costing approximately $750 million.
   6) About one in 10 dairy females have breeding difficulties due to general health and nutritionally related problems.
   7) Approximately 40 percent of dairy cows are afflicted with a form of mastitis, which means $225 per year, per cow. (Mastitis-infected products cannot be used for human consumption.)
   8) About 5 percent of all ewes never lamb due to general health problems.
   9) Approximately 20 percent of all lambs die between birth and weaning because of general health and/or nutrition problems.
   10) Approximately 3 percent of all lambs on finishing rations die due to general health problems.
   11) Nearly 15 percent of all bred sows never farrow due to general health problems.
   12) Approximately one-fourth of all pigs die between birth and weaning.
   13) Approximately 50 percent of all bred mares abort or have weak foals due to general health problems. (This means that two mares are kept to produce one foal.)
   14) Approximately 6 percent of all foals die between birth and weaning due to general health problems.

c) There are also hidden costs that are not figured into the $11 billion lost yearly due to general health problems. These costs are reflected in poor meat quality, infected carcasses, added labor costs, retarded growth, inspector salaries, depreciation of infected land, and many other costs.

d) Some animal diseases can be transferred to humans by contact. There are strict regulations for these diseases because of the effects on humans. Here are some important animal diseases that can be transferred to humans.
   1) Lyme disease - Transmission of this disease is usually by a bite from a tick or by crushing an infected tick on broken skin. The increased risk to humans has been caused by more animals bringing the infected ticks closer to human habitations. Human cases of Lyme disease have been reported in the East coast, West coast, Great Lakes, and a few southern states. Human symptoms are skin lesions around the bite and arthritis in large joints. Sometimes symptoms do not appear until four years after contact. It is a curable disease, but there could be some permanent damage to a fetus and some neurological damage, which could be prevented by early detection.
   2) Brucellosis - Transmission of this disease can occur by contacting an aborted, stillborn fetus or placental tissues with cuts or scrapes on a person's hand. (It cannot penetrate normal skin.) It can also be transmitted by breathing aerosols containing the organism (such as in a packing plant) or consumption of unpasteurized dairy products. This organism cannot survive in dry conditions, in sunlight, or extremely hot conditions, but under favorable conditions it can survive for 3-4 months. Human symptoms are continued and intermittent occurrences of fever, headaches, profuse sweating and chills, depression, body aches, and weight

loss. Without proper treatment, these symptoms persist for several months. This disease cannot be transmitted to other members of the family by humans.

3) Rabies - Transmission of this disease occurs from a bite of a rabid animal. This natural disease occurs in animals to regulate overpopulation. In humans, 90 percent of the rabies cases are reported by wild animals, and the other 10 percent is from domesticated pets. This is why vaccination of pets is so vital. In humans, rabies is a curable disease if caught in time, but even the cure is very painful.
4) Salmonellosis - Transmission of this disease occurs through consumption of contaminated foods not properly stored or cooked. Salmonellosis can be found in pork, beef, poultry, eggs, milk, and even vegetables grown with infected fecal fertilizers. Symptoms occurring in humans from salmonellosis are intestinal infections, fever, abdominal cramps, vomiting, nausea, and diarrhea. Salmonellosis is a treatable disease by correcting dehydration and electrolyte imbalances.
5) Trichinosis - Transmission of this disease occurs by eating infested meat. Primary sources of trichinosis are under-cooked pork and wild animals, primarily carnivores such as bears. With proper cooking, this disease can be prevented. Symptoms are inflamed muscles or allergic reactions.
6) Cryptosporidiosis - Transmission of this disease occurs by ingesting contaminated food or water and by working around infected fecal material. Generally, people do not even know they are infected by cryptosporidiosis because the human body develops immunity to this disease. Diarrhea is the typical symptom in humans. This disease is more prominent in the population affected by Acquired Immune Deficiency Syndrome (AIDS) because their immune systems can no longer fight off disease.
7) Cowpox - Transmission occurs when a human comes in contact with an infected animal during the milking process. There appears to be a relationship between cowpox and smallpox immunizations. There are artificial immunizations for cowpox in humans. Human symptoms include sores on the skin. For dairy producers, the infections will usually appear on hands and arms, which are two areas that come into contact with the animal the most.
8) Brucellosis - Transmission occurs when a human comes in contact with an infected animal. This usually happens when disposing of dead, infected animals without knowledge of the cause of death. Infection in humans can also occur by ingesting contaminated dairy products. This disease is highly regulated and controlled by state institutions because of its contagious nature to humans.
9) Ringworm - Transmission occurs when a human comes in contact with the fungus through an infected animal or infected quarters where the animal has been. Human symptoms usually appear as discolored spots on the skin. This fungus can live up to 18 months on fence posts, animal brushed, or curry combs.

3. It costs approximately $3 million for a drug to be approved for human use. Ask students how drugs are approved for livestock and the procedure used for drug authorization.

How are drugs approved?

a) Development of new drugs
   1) A new drug begins when a manufacturing company sees the need for it and has the research capabilities for developing it. Generally, a new drug is developed through the discovery of a new compound that could be useful in animal health. Research and development must prove that the compound is effective, safe, and convenient to use.
   2) Research and development of a new drug is expensive, time-consuming, and exacting. In 1988, animal health institutions spent $340 million on research and development of new drugs.

b) Approval process for new drugs
   1) Discovery - The first step in drug approval is the discovery of a new compound that is suitable for animal health. This discovery could be accidental or discovered through research and development.
   2) Preliminary trials - Once a compound is found helpful in animal health, it goes through some preliminary trials. Three questions must be answered before intense development procedures take place.
      (a) Does the new drug have any undesirable traits? What is the potential activity of the new compound?
      (b) What are the estimated costs for research and the anticipated demand for this new compound?
      (c) Can it be confirmed that the new compound will do what it is supposed to do?
   3) Pre-clinical trials - Pre-clinical trials target animals on which the drug could be used. These trials are usually done in a laboratory setting on lab animals. Exaggerated dosages are given to determine the effects. If the manufacturer is still convinced of the effectiveness of the compound, appropriate agencies are notified.
   4) INAD/EUP notification - INAD (Investigational New Animal Drug) is the branch of the FDA that is notified. If the new compound is a pesticide, an EUP (Experimental Use Permit) is the notification to the EPA. These applications show the results of safety, effectiveness, and toxicity studies of the compound, as well as plans for continued testing and small amounts of the compound. After receiving an INAD or EUP file number, the manufacturer makes the final decision to go ahead with clinical testing.
   5) Clinical trials - Clinical trials consist of full-scale field trials. At this point, the manufacturer has a sizable investment in the compound and determines if it will be economical to continue research. Field trials are done on animals targeted for usage of the drug. These studies consist of toxicity levels, dosage, residue studies, effectiveness, and blind studies. In blind studies, animals receive the compound in such a way that researchers are not aware of which animals received it. The data is evaluated to show the effectiveness of the compound.
   6) Drug and pesticide approval - Here, a manufacturer applies to federal agencies for the right to produce the new drug. The manufacturer files for a NADA (New Animal Drug Application) or a pesticide permit. The typical NADA application would fill an average encyclopedia volume. It reveals the results of environmental effects, safety to users, animals, and consumers.
   7) Monitoring - Once the drug or pesticide is marketed, the manufacturer must report findings back to federal agencies every six months for the first year, as well as yearly for the remaining years the drug or pesticide is produced. Further monitoring is done by veterinarians across the country, who report on any adverse conditions that occur through usage of the drug or pesticide.

4. Why is it important to know the differences between population and individual medications?

What are differences between population and individual medications?

a) Individual medications are administered to one individual animal. The label verifies the dosage per individual, which is justified by body weight, age, or type of production.
b) Individual medications can be over-the-counter drugs, extra label drugs, or prescription drugs administered by veterinarians.
c) Population medications are mixed with feed, a complete feed, or fed by themselves. These drugs are usually classified as feed additives and administered for a population of animals.

d) To deworm a pen of finished cattle, mix the dewormer in the feed and medicate the whole population. Population medications are usually mixed into feed.
e) As mentioned previously, individual medications are approved after going through a long, expensive process.
f) Population medications and feed additives go through a different process for approval than individual medications. However, both have federal agencies regulating the approval of these medications.

5. Ask students if they know the legalities of transporting animals in state and out of state.

What are government health regulations for movement of livestock interstate and intrastate?

a) Intrastate regulations
   1) It is a "buyer beware" market when purchasing and transporting livestock within the state of Missouri. Livestock can be transported anywhere in the state without a health certificate.
   2) A buyer can request health papers, but the seller does not have to provide them.
   3) If a producer buys livestock at an auction, some health tests will be run at that sale barn. The actual types of tests are determined by the operator of the sale barn.
   4) Most purebred and crossbred operations have health papers on all stock in their operation.
   5) Most other states have similar intrastate regulations.
b) Interstate regulations
   1) Each state has different regulations on interstate transportation of livestock. If a Missouri producer sells cattle to a Kansas producer, the seller is responsible for finding out Kansas health regulations so the cattle can be transported legally. Then, a veterinarian can run the required health tests. If the cattle pass the required tests, a health certificate is issued for that group of cattle that stays with them through the entire process of interstate transportation.
   2) A health certificate is not necessary for each state that the cattle pass through--just the state of destination. To be safe, however, contact each state veterinarian's office.
c) Federal regulations
   1) Livestock cannot be transported on a rail car for more than 28 hours without rest, food, and water. This rest period must last for five hours before being loaded back up for transportation.
   2) Livestock traveling by truck or trailer cannot be transported for more than 24 hours without rest, food, and water. The break must last at least five hours before the animals are loaded up again.

F. Other activities

1. Invite personnel from the state Dept. of Agriculture to discuss the rules and regulations of livestock transportation.

2. If a speaker phone is available, demonstrate the Voice Response Service coordinated by the USDA's Center for Epidemiology and Animal Health. Using a touchtone phone, call 800/545-USDA (8732) to connect with the service, which supplies information on state regulations (including transportation), emergency notices, animal care, etc.

3. Show the video, *Cattlemen Care About Animal Welfare* (10 minutes, AG video 188), available from the Missouri Vocational Resource Center.

G. Conclusion

It is important to understand the economic importance of animal health and the costs associated with it. As a consumer, it is vital to understand diseases associated with eating animal products and the possible human effects. Consumers and livestock producers should understand the importance of drugs and how they are approved for animal health.

H. Competency

Identify the importance of animal health in livestock.

I. Answers to Evaluation

1. 11 billion, 15
2. Hidden
3. Brucellosis
4. Salmonellosis
5. Trichinosis
6. Intrastate
7. New Animal Drug Application
8. Experimental Use Permit
9. Population
10. a, c-h (question worth eight points)
11. b, c, d, f, g (question worth eight points)
12. b, e (question worth five points)
13. a-f (question worth six points)

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EVALUATION

Fill in the blank with the best answer.

1. Animal health problems cost livestock producers $_____ annually, which is _____ percent of cash receipts per livestock producer.

2. Infected carcasses, poor meat quality, additional labor costs, and depreciation of infected land are called _____ costs, which are not figured in annual health problems.

3. The disease, _____ , is transmitted to humans by contact with an infected fetus or placental tissues. Symptoms are fever, headaches, profuse sweating and chills, depression, and body aches.

4. Improper storage and cooking techniques can transmit _____ to humans. Symptoms are intestinal infections, fever, vomiting, nausea, and abdominal cramps.

5. The disease, _____ , is transmitted to humans by ingesting contaminated meat, mainly pork. Symptoms are inflamed muscles or allergic reactions.

6. The transportation of livestock within a state, which does not require a health certificate, is called _____ transportation.

8. EUP stands for _____ .

9. A feed additive is considered to be a _____ medication.

Complete the following multiple answer questions.

10. Check the appropriate steps in drug approval of animal health products.

____ a. Monitoring
____ b. Scheduling
____ c. Discovery
____ d. Clinical trials
____ e. Pre-clinical trials
____ f. Drug and pesticide approval
____ g. INAD/EUP notification
____ h. Preliminary trials

11. Check the factors that are true about individual medications.

____ a. Can be administered through mixing of bulk feeds
____ b. Can be prescribed by veterinarians
____ c. Can be purchased over the counter
____ d. Administered by specific dosages
____ e. Can be administered through the water supply
____ f. Are administered to individual animals
____ g. Are approved by the FDA
____ h. Go through the same approval procedures as population medications

12. Check the requirements needed for interstate transportation of livestock.

____ a. A health certificate for every state the livestock passes through
____ b. A health certificate for only the state of destination
____ c. The rest period for transported livestock must be at least three hours long.
____ d. Livestock transported by rail car cannot travel more than 30 hours without a rest.
____ e. Livestock transported by truck or trailer cannot travel more than 24 hours without a rest.

13. Check the careers that are associated with animal health.

____ a. Veterinarian
____ b. Livestock producer
____ c. Extension livestock health specialist
____ d. Animal health enforcement
____ e. Livestock health scientist
____ f. Animal health products representative

UNIT IV - ANIMAL HEALTH

Lesson 2: Immune System of Livestock

Objective: The student will be able to describe aspects of the immune system of livestock.

Study Questions

1. **What are the causes of different types of diseases in livestock?**
2. **What are the different types of immunity?**
3. **What are the different types of immunizing agents, and how do they work?**
4. **What is an antibiotic, and how does it work?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 2: Immune System of Livestock

TEACHING PROCEDURES

A. Review

Review the previous lesson.

B. Motivation

Bring in different types of vaccines and talk about what they are used for and how they work.

C. Assignment

D. Supervised study

E. Discussion

1. A disease is any condition that detracts or interferes with an animal's well-being. Discuss ways producers can control and prevent diseases within their herds.

What are the causes of different types of diseases in livestock?

a) Noninfectious diseases - not caused by infectious organisms
   1) Nutritional diseases
      (a) These can occur when the animal receives too little or too much of a particular nutrient in the diet.
      (b) A deficiency of certain vitamins and minerals can produce a variety of symptoms, such as poor growth, weak bones, weak muscles, poor eyesight, and a decreased resistance to other diseases.
   2) Metabolic diseases
      (a) Can occur when the animal's organs do not function correctly
      (b) Can happen when the animal undergoes major changes in its life
      EXAMPLE: Milk fever at parturition
   3) Toxic diseases
      (a) Exposure to poisonous materials cause toxic diseases.
      (b) Common livestock poisonings involve farm chemicals (such as insecticides and herbicides) and automotive products (batteries, antifreeze).
      (c) Some poisons form when mold grows on grain or hay that is used for feed.
      (d) Some plants are poisonous.
   4) Injury or trauma
      (a) Lightning strikes
      (b) Lameness after foot injury on rough or rocky surfaces
      (c) Predator animals (such as wolves and coyotes)
   5) Congenital diseases (present at birth)
      (a) These are often caused by faulty development of the fetus inside the mother's uterus.
      (b) Some examples are cleft palate (a hole in the roof of the mouth) and ventricular septal defect (an abnormal opening between two heart chambers).

6) Genetic diseases (inherited from parents)
   (a) Symptoms of genetic diseases may or may not be present at birth.
   (b) One example is porcine stress syndrome.

b) Infectious diseases
   1) Infectious diseases are caused by other living organisms (pathogens) that infect and cause disease.
   2) The way that these organisms cause disease varies.
      (a) Killing the cells or tissues that they infect
      (b) Producing toxins or poisons, which have an adverse effect on the animal's body
      (c) Bacteria and viruses (most common)
         (1) Bacteria are microscopic, single-celled organisms.
         (2) Bacteria are very common; most are harmless, and some may even be beneficial.
         (3) However, a few bacteria are pathogenic and can be harmful to the animal. Pathogenic bacteria require moisture, warmth, and nutrients to grow and multiply. An animal's body provides all of these requirements.
         (4) Bacteria cause disease when they grow in places where they are not supposed to grow or when they produce by-products that are harmful to the animal's body. Some examples of bacterial diseases are *E coli* diarrhea in calves and piglets, blackleg in calves, and erysipelas in pigs.
         (5) Viruses are extremely small particles that can only be seen by the most powerful electron microscopes.
         (6) Viruses cannot grow or reproduce unless they infect the cells of another organism. Some examples of viral diseases in livestock are infectious bovine rhinotracheitis (IBR or red nose) in cattle and transmissible gastroenteritis (TGE) diarrhea in pigs.
      (d) Fungi and protozoa
         (1) Fungi are usually more complex in form than bacteria.
         (2) Fungi can consist of more than one cell with different functions.
         (3) Most familiar fungi (mushrooms, molds) do not infect animals. However, some diseases, such as ringworm and thrush, are caused by fungi, which can infect animals.
         (4) Protozoa are single-celled animals. As with bacteria, most protozoa are harmless and some are even beneficial (helping in digestion, for example). Other kinds of protozoa, such as coccidia, infect animals and cause disease.

2. Animals are faced with exposure to potentially pathogenic organisms every day and usually do not get sick from these exposures. Fortunately, animals have mechanisms to ward off these threats to their health: natural and acquired immunity. Discuss reasons that certain livestock species are resistant to diseases, while others are not.

What are the different types of immunity?

a) Natural, physical barriers protect animals from infection with disease-causing organisms or trap pathogens before they can infect the body.
   1) Skin
   2) Mucus
   3) Tears

b) Certain body cells in the body examine everything they contact to determine whether or not it belongs there.
   1) If found, these cells notify the immune system to produce antibodies against that particular pathogen.
   2) Antibodies are protein molecules that bind with the pathogen and help other cells in the body eliminate it.
c) Active immunity is the process of producing antibodies against a pathogen by a natural exposure to that pathogen or by vaccination.
d) In passive immunity, animals may also receive antibodies that another animal has made (e.g., colostrum or blood serum).

3. Vaccines are basically a modified form of the pathogen that will not cause disease. Discuss what vaccinations are used for and how the students think they work. Ask the students about diseases for which they have been vaccinated. How do producers prevent the spread of disease throughout herds?

What are the different types of immunizing agents, and how do they work?

a) Modified live vaccines
   1) Live viruses or bacteria that have been changed so that they will not produce disease
   2) Very effective at stimulating the animal's immune system
b) Killed vaccines
   1) Viruses or bacteria that have been killed, often by treatment with heat or chemicals
   2) Sometimes called bacterins
c) Toxoids
   1) A changed form of toxin or poison that will help the animal produce antibodies against the toxin
   2) Tetanus vaccine for horses and sheep
d) Antisera and antitoxins (passive immunity)
   1) Antibodies to specific pathogens and toxins that have been formed in the blood serum of another animal
   2) Quick protection against certain diseases, but not as long lasting as the active immunity stimulated by vaccines and toxoids

4. Discuss what antibiotics are used for and how the students think they work.

What is an antibiotic, and how does it work?

a) Antibiotics are compounds produced by microorganisms (often fungi) that either kill or inhibit the growth of other bacteria or fungi.
b) They are often given either by mouth or by injection.
c) Many different antibiotics are available.
   EXAMPLES: Penicillin and tetracycline
d) Some pathogens are resistant to the effects of certain antibiotics.
e) Antibiotics have no effect on viruses.

F. Other activities

1. Look at bacteria under the microscope.

2. Ask the local veterinarian or school nurse to talk to the class about vaccinations and antibiotics.

G. Conclusion

Animal diseases are the world's oldest and toughest enemies. Losses from animal diseases and parasites cost producers and the economy billions of dollars. Much of this waste could be reduced by disease-prevention programs.

H. Competency

Describe the aspects of the immune system of domestic livestock.

Related Missouri Core Competencies and Key Skills

10C-2: Hypothesize how genetic resistance develops from continued exposure to pesticides or antibiotics.

I. Answers to Evaluation

1. c
2. a
3. d
4. d
5. a
6. a
7. b
8. d-f (question worth eight points)

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EVALUATION

Circle the letter that corresponds to the best answer.

1. Which type of vaccine lasts the shortest period of time?

   a. Modified live vaccine
   b. Toxoid
   c. Antiserum and antitoxin
   d. Killed vaccine

2. Antibiotics have no effect on which of the following?

   a. Viruses
   b. Bacteria
   c. Fungi
   d. Protozoa

3. Which is true of antibiotics?

   a. Produced by microorganisms (often bacteria)
   b. Never given by mouth
   c. Few kinds are available.
   d. Effects can be resisted by some pathogens.

4. Feeding colostrum to newborn animals is a form of which type of immunity?

   a. Active
   b. Required
   c. Natural
   d. Passive
   e. Individual

5. From what do antibiotics originate?

   a. Living microorganisms
   b. Dead microorganisms
   c. Toxic materials
   d. Metabolic materials

6. What is produced by the tissues in reaction to disease?

   a. Antibodies
   b. Antiserum
   c. Bacterins
   d. Toxoids

7. Which is produced in the blood serum of another animal?

a. Modified live vaccines
b. Antiserum and antitoxins
c. Killed vaccines
d. Toxoids

Complete the following multiple answer question.

8. Check natural defense mechanisms animals use to fend off infectious diseases.

____ a.	Vaccines	____ e.	Mucus
____ b.	Toxoids	____ f.	Antibodies
____ c.	Bacteria	____ g.	Hair
____ d.	Skin	____ h.	Antibiotics

UNIT IV - ANIMAL HEALTH

Lesson 3: Respiratory Diseases Affecting Livestock

Objective: The student will be able to understand and describe the diseases of the respiratory system affecting livestock.

Study Questions

1. **What are the major swine respiratory diseases, their symptoms, and treatments?**
2. **What are the major cattle respiratory diseases, their symptoms, and treatments?**
3. **What are the major equine respiratory diseases, their symptoms, and treatments?**

References

1. Student Reference
2. Activity Sheet
   a) AS 3.1: Respiratory Diseases

UNIT IV - ANIMAL HEALTH

Lesson 3: Respiratory Diseases Affecting Livestock

TEACHING PROCEDURES

A. Review

Review previous lesson on aspects of the immune system of domestic livestock.

B. Motivation

Why is it important for non-veterinarians to know respiratory diseases of livestock? Someone in livestock production or a related occupation should understand the effects of respiratory diseases on a single operation and the entire livestock industry. To prevent diseases from spreading throughout the herd and causing extreme losses, a producer must be able to recognize the symptoms of these diseases. Everybody should understand how outside influences can trigger a respiratory infection within a herd. The effects of stress lead to many infections in livestock. Like humans, animals under stress are more likely to be invaded by viruses or bacteria because their bodies are run down.

C. Assignment

D. Supervised study

E. Discussion

1. See if students can come up with some major respiratory diseases in swine.

What are the major swine respiratory diseases, their symptoms, and treatments?

a) Atrophic rhinitis
   1) Description - Atrophic rhinitis is a highly transmissible disease in swine caused by bacteria *(Bordetella* and *Pasteurella).* It causes distortion of the nasal passages. Infected swine have lower production levels and are more susceptible to other respiratory diseases. Atrophic rhinitis is not a fatal disease--just an unwanted disease. It is transmitted as an aerosol from an infected hog to a noninfected one. Other carriers are dogs, cats, rabbits, mice, turkeys, horses, and humans.
   2) Symptoms - Sneezing and sniffling are the most common symptoms in swine and are good early detections for the disease. Coughing and snorting are other symptoms of atrophic rhinitis. Inflammation of nose membranes is also a good indication of this disease. As the disease matures, the shape of the nose becomes deformed. The nose turns to one side or the other by as much as 45 degrees.
   3) Prevention - A producer must monitor the contact with outside animals. A producer must also correct environmental deficiencies in sanitation, temperature, humidity, and ventilation. Control dust, drafts, excessive ammonia, and over-crowding.
   4) Treatments - A producer can protect against *Bordetella* and *Pasteurella* organisms by medicating feed with sulfamethazine or oxytetracycline.

b) Mycoplasma pneumonia
   1) Description - Transmission of the disease occurs easily by contact. Other means of transmission are: infected clothing, dust, and wind transmission from shed to shed. Young pigs are most susceptible at 3-9 months. Pigs showing symptoms of this disease that appear to have recovered still become carriers of the disease. Also, symptoms can reappear if pigs become stressed. The mortality rates for

Mycoplasma pneumonia are relatively low, but secondary infections can increase death, so treatment is important in controlling the disease.

2) Symptoms - A dry, hacking, repetitive cough in young pigs are typical chronic symptoms of mycoplasma pneumonia. Infected pigs remain alert and still have a healthy appetite but have reduced growth rates, weights, and feed efficiency. Acute cases cough and pant and appear to have a fever, little appetite, and a staggering gait.
3) Prevention - Isolate and observe outside animals brought into the herd. This also applies to animals that are suspected to be infected. After working with infected animals, change and wash clothing worn during the process. Make sure there is appropriate feed and water so animals do not come under further stress. There are vaccines available to prevent this disease.
4) Treatments - There are a wide variety of antibiotics and feed additives to treat animals. It is recommended that different medications be used so the disease does not become resistant to one medication. Keep infected animals isolated in a dry, warm, well-ventilated area with appropriate feed and water.

c) *Pasteurella* pneumonia
1) Description - Like most respiratory diseases, *Pasteurella* pneumonia spreads in the aerosol form. Younger pigs are generally affected by the disease. Pigs of 8-24 weeks are most susceptible to *Pasteurella* pneumonia. Mortality rates are high if effective treatments are not administered. Death can occur as quickly as 5-10 days if not treated.
2) Symptoms - Fever, coughing, depression, mouth breathing, and labored abdominal movements are all typical acute symptoms of *Pasteurella* pneumonia. Chronic symptoms are intermittent coughing and signs of unthriftiness.
3) Prevention - Chilling, dusty conditions, poor nutrition, a change in ration, overcrowding, poor ventilation, and poor hygiene can trigger *Pasteurella* pneumonia. All these factors are signs of poor management.
4) Treatment - Infected animals can be treated with antibiotics through injections. Other animals that shared the same airspace can be treated with feed or water additives for 5-7 days. Like most respiratory diseases, *Pasteurella* pneumonia is a treatable and preventable disease if caught early enough.

d) Haemophilus pneumonia
1) Description - Weaning-age pigs are the most susceptible to Haemophilus pneumonia, but all ages of swine can be infected. Like most respiratory diseases, Haemophilus pneumonia is transmitted in the aerosol form. Mortality rates are as high as 60 percent if it is not treated quickly.
2) Symptoms - Severe respiratory distress, severe abdominal respiration, and bloodstained discharge from the nose and mouth are acute symptoms of Haemophilus pneumonia. This particular disease hits fast. Some infected pigs die within a few hours or in a couple of days. A true, fatal sign of this disease is when pigs lie down and are not inclined to move. Chronic cases are usually non-fatal, and pigs show signs of ill thrift, persistent cough, fever, and respiratory distress.
3) Prevention - A good preventive measure for Haemophilus pneumonia is to provide well-ventilated, clean, and properly spaced conditions. Infected pigs that have been treated might develop immunity to future outbreaks of this disease. Also, sows that have been infected and treated might pass immunity to the offspring by colostrum in the milk. It is also a good idea to isolate outside animals for a while to observe for symptoms.
4) Treatment - There are several available antibiotics used to treat secondary infections in pigs. Treatments come in the forms of feed or water additives and injections. It is very treatable if infected animals can be isolated quickly to prevent spreading of the disease to the herd.

e) *Salmonella choleraesuis*

1) Description - This organism enters the body orally, multiplies in the intestinal tract, crosses the intestinal wall, and spreads throughout the rest of the animal. It undergoes its most rapid growth and does the most damage in the lungs. This disease is usually seen in pigs from 40 pounds to finish weight but can occur in any aged pig.
2) Symptoms - The most common sign is sudden death in pigs that had been doing very well. If observation is frequent enough and detailed enough, one may actually see pigs become somewhat listless, experience difficulty breathing, and progress rapidly to severe respiratory difficulty and death. Animals dying from this disease often have purplish discoloration of the ears, belly, and/or feet and lower legs.
3) Prevention - Sanitation efforts are extremely cost-effective in preventing this disease because it is transmitted through the feces. Minimizing stress also helps in prevention; many hogs can be carriers but yet will never have problems if they are not stressed enough to lower their resistance. Stressors include overcrowding, drastic temperature fluctuations, feed/water shortages, movement, mixing, etc. While preventive antibiotic therapy and/or use of vaccines can offer some benefit, their long-range cost-benefit ratio will not be as great as improved sanitation and decreased stress.
4) Treatment - In an outbreak, water medication and individual injections with appropriate antibiotics are the best approaches. Antibiotic selection needs to be based on cultures tested in a laboratory and known successes in the local region.

f) Porcine Reproductive and Respiratory Syndrome (PRRS)

1) Description - This disease was first diagnosed in the mid-1980s. It is caused by a type of virus, which produces two known syndromes: a reproductive herd problem and a respiratory syndrome found primarily in pigs younger than 10 weeks old. The virus is usually transmitted through pig-to-pig contact. The virus is shed from the respiratory system, in the feces, and in the semen. There may be some transmission through the air.
2) Symptoms - PRRS presents itself primarily as a difficulty in breathing that often progresses to a deep cough, rough hair coat, poor growth, and an increase in secondary bacterial infections of the respiratory tract (e.g., *Pasteurella, Bordetella, Haemophilus, Streptococcus, Actinobacillus, Salmonella,* etc.). Death losses can often be as high as 25 percent within a group of pigs. Deaths are from secondary infections, not from the virus itself.
3) Prevention - The best prevention is maintaining a negative herd through tight biosecurity and obtaining replacement stock from a known negative herd. In addition, making use of all-in, all-out pig flows will help prevent the disease from reaching its most severe level. A commercially approved vaccine is available to help prevent the disease. It is approved for use in pigs that are 3-16 weeks of age.
4) Treatment - There is no treatment for the viral disease itself, so treatment efforts are aimed at secondary invaders that complicate and worsen the disease.

2. See if students can come up with some major respiratory diseases in cattle.

What are the major cattle respiratory diseases, their symptoms, and treatments?

a) Infectious Bovine Rhinotracheitis or "Red Nose" (IBR)

1) Description - This disease is transmitted by infected droplets that are spread by coughing and by nose-to-nose contact. Also, the disease can be spread venereally or by contaminated examination instruments. The virus can be found in infected tissues of aborted fetuses and in nasal or ocular (eye) fluids of infected animals, but rarely in blood. All ages and breeds of cattle are susceptible. IBR can

be fatal, but generally it only causes reproductive and respiratory problems to appear.

2) Symptoms - Symptoms are: open-mouth breathing, fever, large amounts of nasal discharge, and a fiery red nose. Symptoms such as depression, a lack of appetite, labored breathing, and coughing are prominent signs of IBR.

3) Prevention - IBR is so widespread it is hard to find a herd that does not have a carrier. Prevention is usually by vaccines and natural immunity. Less-confined environments reduce chances of an outbreak of IBR. Cattle can develop a natural immunity to this disease, but vaccinations prevent secondary infection.

4) Treatment - Antibiotics on severely affected animals helps suppress secondary infections, but antibiotics have little to no effect on the virus.

b) *Pasteurella* infections

1) Description - *Pasteurella* is a bacterial infection usually affecting feedlot or grouped, well-confined animals. This disease can affect all ages of cattle. A *Pasteurella* infection can be spread by droplets in the air, contact, coughing, or feeding equipment. This is a very treatable disease, especially in older animals. More severe and fatal cases hit the younger population.

2) Symptoms - Infected animals show signs of fever, persistent cough, discharge from the nose, rapid respiration, and sometimes diarrhea. Other symptoms are depression, lowering of the head, and sometimes eye discharge.

3) Prevention - Prevention depends largely on good management practices for stress prevention. Avoid quick ration changes, overcrowding, outside infections, and stressful movement of cattle.

4) Treatment - It is essential to keep isolated animals in a dry, warm, well-ventilated area. Antibiotics and the proper environment will speed the recovery process.

c) Bovine Respiratory Syncytial Virus (BRSV)

1) Description - BRSV usually targets the younger population of cattle in feedlots. Transmission of the disease occurs through the aerosol form or contact. Generally, weaning-age stock is infected the heaviest with the disease. Cattle of 6-9 months are most susceptible in feedlot conditions and have very high mortality rates. Older cattle can be affected with the disease, but not as fatally.

2) Symptoms - Coughing, depression, large quantities of nasal discharge, open mouth breathing, and frothing are true indications of BRSV. Fever, severe respiratory distress, and extension of the neck are other symptoms. July through October seem to have the highest number of cases. Once it becomes colder, the cases decline in number.

3) Prevention - Weaning-age stock in feedlot conditions are the most susceptible population. Isolate suspected animals as quickly as possible to reduce the spread of the disease. Sudden changes in diet or water supply will induce extra stress on the animals.

4) Treatment - Antihistamines and vitamins are used for treating infected animals with BRSV. Revaccinating for IBR has also been effective against BRSV. Remember, isolating infected animals and providing proper environmental conditions will aid in treating these animals.

d) Bovine Virus Diarrhea (BVD)

1) Description - BVD generally occurs by contact, infected urine, or by the aerosol form. All populations of cattle can be affected, but the most susceptible animals are 6-18 months old. More cases of this disease are reported during the winter and early spring months. A persistently infected bull can spread the disease through his semen to uninfected cows and their fetuses.

2) Symptoms - Acute cases generally show signs of a fever, depression, weakness, oral and nasal lesions, dehydration, diarrhea, lameness, nasal discharge, and increased salivation. In acute cases, fatalities usually occur 3-4 days after infection. Since the disease is carried through the bloodstream, a pregnant cow

can abort her fetus. Chronic cases can linger for 2-6 months and sometimes past a year. These chronic cases remain carriers for the disease.

3) Prevention - Stress, hormonal changes associated with puberty, and the enhancement of an already existing virus can trigger the infection of BVD.

4) Treatment - Vaccinations control the spread of the disease to uninfected animals. The infected animals usually die, and the ones that survive should be destroyed.

3. See if students can come up with some major equine respiratory diseases. Explain that horses, donkeys, zebras and mules belong to the equine family, just as beef and dairy cattle are in the bovine family.

What are the major equine respiratory diseases, their symptoms, and treatments?

a) Strangles

1) Description - Due to bacterial *Streptococcus equi,* younger horses are particularly susceptible to strangles, but any horse that has not suffered from the disease previously will also be susceptible. Infection spreads through inhaling or ingesting droplets breathed or coughed from infected animals. This very contagious bacterial disease affects the upper respiratory tract in horses. This is a very treatable disease, but it can also be fatal. Strangles spreads quickly.

2) Symptoms - Animals infected by strangles have a very high fever, coughing, snorting, and thick mucus discharge. The throat, pharynx, and larynx become inflamed, and the animals have difficulty swallowing. Often when food or water is swallowed, these substances are regurgitated back through the nostrils.

3) Prevention - Isolating infected animals helps control spreading of the disease. Cold, poorly ventilated stables and very confined conditions can lead to an outbreak. Overworked animals and severe weather conditions can also increase the chances for this disease. Since humans can also spread the disease, disinfect all clothing after working with infected animals.

4) Treatment - There are several antibiotics available for treatment; early treatment will help prevent abscesses.

b) Rhinopneumonitis

1) Description - Rhinopneumonitis is a viral disease transmitted by droplets in the aerosol form. The virus circulates through the bloodstream and localizes in the respiratory tract. The disease is usually concentrated to younger horses. Donkeys and horses are the only species that have been reported to be infected naturally. Rhinopneumonitis is a treatable disease but is known for aborting foals.

2) Symptoms - Generally an outbreak occurs in the autumn and winter months and is usually mistaken for a cold. Horses infected by the disease will have a fever, congestion, and nasal discharge. Sometimes coughing and loss of appetite can be symptoms. This disease is very difficult for a rancher to diagnosis without the help of a licensed veterinarian.

3) Prevention - Isolate infected animals from the herd. A rancher could reduce outbreaks by not confining animals in tight, poorly ventilated areas. There are vaccinations, but they are not proven 100 percent effective.

4) Treatment - There are a number of antibiotics that can be used to control secondary infections. Certain antibiotics are used strictly for nursing mares, while others are used for gestating mares.

c) Equine influenza

1) Description - Equine influenza is an acute, highly infectious, viral disease in horses. The disease is transmitted in the aerosol form and has very high mortality and abortion rates. Outbreaks usually occur when moving or grouping horses. This disease is so infectious that horse shows require health papers stating the animal has been vaccinated against the disease.

2) Symptoms - Symptoms of Equine influenza are very similar to other respiratory diseases in horses. These symptoms include: fever, nasal discharge, depression, weakness, dehydration, and loss of appetite. This disease is fatal but can be treated if caught quickly. Death and aborted foals are extreme symptoms of Equine influenza.

3) Prevention - Ranchers and owners must be aware of this disease when grouping and moving animals or introducing outside animals. There are vaccinations to prevent this disease.

4) Treatment - Isolating infected horses is important in treating them and preventing the spread of the disease throughout the herd. Keeping the infected animal in a dry, warm, well-ventilated area will also help. There are antibiotics available to prevent secondary infections for infected animals.

F. Other activities

1. A visit from a licensed veterinarian would help students apply this material. A veterinarian should have real-life examples to use so the students can better understand these diseases. The interaction with students might shed some light on other respiratory diseases.

2. As students work through the lesson, have them fill out Activity Sheet 3.1 as they learn about the respiratory diseases for each class of livestock. This will help students see the differences and similarities in the diseases.

G. Conclusion

It is important for livestock producers and others in the livestock health field to have a good knowledge base of respiratory diseases, their symptoms, and treatments. The producer is the first step in the prevention, treatment, and detection of any respiratory diseases because they come into contact with the animals more often than any other person. Everyday observations of livestock are critical for prevention, treatment, and detection of respiratory diseases.

H. Competency

Describe the diseases of the respiratory system affecting livestock.

I. Answers to Evaluation

1. Antibiotics
2. Vaccines
3. Atrophic rhinitis
4. Strangles
5. Isolate
6. a-h (question worth eight points)
7. a, c, d, f, i, j (question worth 10 points)
8. a-e, i, j (question worth 10 points)

J. Answers to Activity Sheet

AS 3.1 (Answers may vary but should be similar to the following.)

Swine	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Atrophic rhinitis	Disease that causes distortion of the nasal passages	Hog-to-hog (aerosol) or from dogs, cats, rabbits, mice, turkeys, horses, humans	Sneezing, sniffling, coughing, snorting, inflammation of nose membranes	Monitoring contact with outside animals; controlling sanitation, temperature, humidity, ventilation, dust, drafts, extra ammonia, overcrowding	Isolating infected animals; medicating feed for uninfected animals
Mycoplasma pneumonia	Affects pigs 3-9 mos.	Contact; infected clothing, dust, and wind	Dry, hacking, repetitive cough; reduced growth rates, weights and feed efficiency **Acute cases:** coughing, panting, fever, reduced appetite, staggering gait	Isolating and observing outside animals entering the herd; always changing and washing clothes after being around infected pigs; providing plenty of food and water	Antibiotics; feed additives; keeping infected animals in dry, warm, well-ventilated area with enough feed and water
Pasteurella pneumonia	Respiratory disease affecting pigs 8-24 weeks	Aerosol form	**Acute:** fever, coughing, depression, mouth breathing, labored abdominal movements **Chronic:** intermittent cough, ill thrift	Good management practices; catching and treating it early to avoid spreading	Injected antibiotics for infected pig, others treated with feed or water additives for 5-7 days
Haemophilus pneumonia	Respiratory disease	Aerosol form	Severe respiratory distress, severe abdominal respiration, bloody discharge from nose and mouth **Fatal:** lying around with no desire to move **Chronic:** ill thrift, persistent cough, fever, respiratory distress	Well-ventilated, clean, uncrowded conditions	Antibiotics in feed and water; injections; isolating infected animals to prevent spreading; treating ASAP; immunity usually developed by treated pigs and passed on by immune sows through milk
Salmonella choleraesuis	Lung damaging	Enters body orally, multiplies in intestinal tract and spreads all over	Sudden death in previously healthy pigs; listlessness, difficulty breathing, death; purplish discoloration of ears, belly, feet or lower legs	Sanitation efforts, minimizing stress, preventive antibiotic therapy/vaccines	Water medication, individual injections; feed medications for long-term control
PRRS	Caused by a virus; produces a reproductive herd problem and a respiratory syndrome in pigs younger than 10 weeks	Pig-to-pig contact; aerosol form; shed from respiratory system, feces and semen	Difficulty breathing, deep cough, rough hair coat, poor growth, increase in secondary bacterial respiratory tract infections	Maintaining negative herd with tight biosecurity; getting replacements from known negative herds; using vaccines and all-in, all-out pig flows	No treatment for disease itself, so treat secondary problems

Cattle	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Infectious Bovine Rhinotrache-itis	Causes other respiratory and reproductive problems	Aerosol form and nose-to-nose contact, venereally or from contaminated examination instruments	Open-mouth breathing, fever, large amounts of nasal discharge, fiery red nose, depression, lack of appetite, labored breathing, coughing	Vaccines and natural immunity, less-confined environments	Antibiotics for secondary infections, but animals need to rid bodies of virus naturally
Pasteurella infections	Bacterial infec-tion affecting feedlot, grouped or well-confined animals	Aerosol form, contact, feeding equipment	Fever, persistent cough, discharge from nose, rapid breathing, perhaps diarrhea, depression, lowering of heat, eye discharge	Reducing stress by avoiding quick ration changes, over-crowding, outside infections, stressful movements	Isolation in dry, warm, well-venti-lated area; using antibiotics and proper environ-mental conditions to speed recovery
Bovine Respiratory Syncytial Virus	Usually affects weaning-age stock in feedlots during the summer	Aerosol form or contact	Coughing, depression, lots of nasal discharge, open-mouth breathing, frothing; also fever, severe respiratory distress and extension of the neck	Watching young stock closely, making gradual changes in diet or water, vaccinating	Providing anti-histamines and vitamins; revac-cinating for IBR
Bovine Virus Diarrhea	Frequently affects young (6-18 mo.) during winter	Aerosol form, by contact or infected urine and semen	Fever, depression, weakness, oral and nasal lesions, dehydration, diarrhea, lameness, nasal discharge, increased salivation, abortion **Acute:** death 3-4 days after infection	Vaccinating, avoiding stress	None--survivors to be destroyed

Horses	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Strangles	Very contagious bacterial disease of upper respira-tory tract	Inhaling/in-gesting droplets from infected ani-mal or from contact with humans who have been in contact with the disease	Very high fever, coughing, snorting, thick mucous discharge; throat, pharynx, larynx inflamed; difficulty swallowing	Isolating infected animals; providing heat, ventilation, room to move; avoiding overwork or severe weather conditions; disin-fecting clothing afterward	Antibiotics, isolation of infected animals
Rhinopneu-monitis	Viral disease in horses and donkeys	Aerosol form only	Usually mistaken for a cold--fever, congestion, nasal discharge, occasional coughing, loss of appetite	Providing well-ventilated, roomy quarters; vaccina-tions available but not guaranteed effective	Isolating infected animals; using anti-biotics for secondary infections (special ones for nursing and gestating mares)
Equine influenza	Highly infectious, acute respiratory disease	Aerosol form, usually when moving/group-ing horses	Fever, nasal discharge, depression, weakness, dehydration, loss of appetite	Vaccine, limiting outside contact with other horses	Treating quickly by isolating infected horses and keeping them in dry, warm, well-ventilated area; using antibiotics for secondary infections

UNIT IV - ANIMAL HEALTH Name_____

Lesson 3: Respiratory Diseases Affecting Livestock Date_____

EVALUATION

Fill in the blank with the best answer.

1. Administered medications used to prevent secondary infections from appearing in livestock are called _____.

2. Medications used to prevent specific diseases from appearing in livestock are _____.

3. When the nose of a hog turns to the left or right, this deformation is a symptom of _____.

4. Food and water being regurgitated back through nostrils in horses is a symptom of _____.

5. A producer should always _____ infected animals from the rest of the herd to prevent spreading of disease.

Complete the following multiple answer questions.

6. Check all the modes of infection that apply to livestock respiratory diseases.

____ a.	Feeding equipment	____ e.	Contaminated veterinarian utensils
____ b.	Human contact	____ f.	Contaminated food
____ c.	Other animal contact	____ g.	Contaminated water
____ d.	Aerosol form	____ h.	Venereally

7. Check the appropriate symptoms of respiratory diseases in livestock.

____ a.	Coughing	____ f.	Nasal discharge
____ b.	Increased appetite	____ g.	Eye watering
____ c.	Dehydration	____ h.	Blindness
____ d.	Depression	____ i.	Open-mouth breathing
____ e.	Muscle contractions	____ j.	Fever

8. Check the appropriate preventive measures for livestock respiratory diseases.

____ a.	Avoid stress.	____ f.	Avoid well-ventilated areas.
____ b.	Vaccinate.	____ g.	Avoid dry areas.
____ c.	Isolate infected animals.	____ h.	Avoid any sanitation practices.
____ d.	Avoid ration changes.	____ i.	Water down work area when working animals.
____ e.	Avoid overcrowding.	____ j.	Develop a herd health program.

Lesson 3: Respiratory Diseases Affecting Livestock Name_____

RESPIRATORY DISEASES

While working through the lesson, fill out this chart to help you see the differences and similarities in the diseases.

Swine	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Atrophic rhinitis					
Mycoplasma pneumonia					
Pasteurella pneumonia					

Swine	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Haemophilus pneumonia					
Salmonella choleraesuis					
PRRS					

Horses	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Strangles					
Rhinopneu-monitis					
Equine influenza					

Cattle	What is it?	Mode of infection	Symptoms	Prevention	Treatment
Infectious Bovine Rhinotracheitis					
Pasteurella infections					
Bovine Respiratory Syncytial Virus					
Bovine Virus Diarrhea					

UNIT IV - ANIMAL HEALTH

Lesson 4: Diseases of the Gastrointestinal Tract

Objective: The student will be able to describe the diseases of the GI tract in livestock.

Study Questions

1. **What are the major GI diseases of swine, their symptoms, and treatments?**
2. **What are the major GI diseases of cattle, their symptoms, and treatments?**
3. **What are the major GI diseases of horses, their symptoms, and treatments?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 4: Diseases of the Gastrointestinal Tract

TEACHING PROCEDURES

A. Review

Review Lesson 2 in Unit I (Livestock Digestive Systems).

B. Motivation

Bring in the digestive tracts of different species of livestock. Consider bringing in disease-infested GI tracts. Bring in products used to treat GI diseases.

C. Assignment

D. Supervised study

E. Discussion

1. Ask the students what diseases they can think of that affect the digestive system of swine.

What are the major GI diseases in swine, their symptoms, and treatments?

a) Baby pig diarrhea
   1) Especially a problem in sows with poor milk flow and in unsanitary, continuous flow farrowing areas
   2) Causes: *Escherichia coli* (*E coli*), transmissible gastroenteritis (TGE), rotavirus, coccidiosis, *Clostridium perfringens* type C, and various combinations
   3) Symptoms
      (a) *E coli* bacteria adhere to the lining of the small intestine and produce toxins, which cause the intestine to secrete excess fluid. The affected pig has diarrhea and becomes ill from dehydration.
      (b) The viruses TGE and rotavirus infect and destroy the lining of the small intestine. The affected pig is contagious and has diarrhea and vomiting, which produces dehydration and starvation.
      (c) *Clostridium perfringens* type C is a toxin-producing bacterium that kills the lining of the small intestine. The pig can have bloody diarrhea and can die of dehydration and starvation.
      (d) Coccidia is a protozoan that infects the lining of the small intestine and causes death with improper absorption and digestion. As with the other pathogens, this produces diarrhea and results in dehydration and starvation. Pigs can only be treated with oral or injectable fluids.
   4) Treatment (except coccidiosis): antibiotics and oral or injectable fluids
   5) Prevention (except coccidiosis): sow vaccination before parturition for colostrum antibody production, cleaning, and disinfection to reduce the number of pathogens in the environment

b) Adult diarrhea and gastrointestinal disease
   1) General
      (a) Usually occur after a pig has been weaned but can also occur in adult breeding animals
      (b) Controlled with good sanitation and all-in/all-out pig flow management

2) Swine dysentery
   (a) Causes: bacteria; can be carried by symptom-free animals
   (b) Symptoms: bloody diarrhea and inflammation of the large intestine
   (c) Treatment: appropriate antibiotics to the feed or water
3) Salmonellosis
   (a) Causes: bacteria, most commonly *Salmonella choleraesuis*
   (b) Symptoms: diarrhea, inflammation of both small and large intestines, infection of the bloodstream, high fevers, purplish skin around ears, snout, and flank
   (c) Treatment: antibiotics added to the feed or water
4) Proliferative enteritis
   (a) Causes: bacteria
   (b) Symptoms: inflammation and thickening of the intestinal lining, resulting frequently in dark, bloody diarrhea
   (c) Treatment: antibiotics
5) Whipworms
   (a) Cause: worm parasites
   (b) Symptoms: inflammation of the large intestine and bloody diarrhea
   (c) Treatment: deworming medicines
6) Gastric ulcers
   (a) Causes: finely ground feed and other factors
   (b) Symptoms: poor appetite and bleeding into the stomach, resulting in dark, tarry manure
   (c) Treatment: none practical

2. Ask the students if they think GI diseases in cattle will differ from those in swine. Have them review parts of the bovine digestive system. Discuss how this can cause diseases to differ. Also, emphasize that colostrum must be received by newborns within the first few hours of birth to ensure antibody protection.

What are the major GI diseases in cattle, their symptoms, and treatments?

NOTE: Proper management is extremely important, both in treating sick animals and eliminating factors that enhance bacteria and virus growth. Infected animals should be isolated and handled last. Keep newborns from having nose-to-nose contact. Keep birthing pastures or pens clean, treat navels to eliminate infection, and prevent overcrowding.

a) Four major categories: anatomical problems, mechanical problems, toxins, and infections (viral and bacterial)
b) Displaced abomasum

   NOTE: Early diagnosis is particularly important as a case of simple displaced abomasum can progress to left displaced abomasum (LDA), right displaced abomasum (RDA), or abomasal volvulus, which is life threatening. Diseases such as ketosis, mastitis, and metritis can occur at the same time.

   1) Cause: unknown--occurs when the abomasum (true stomach) gets out of position and becomes twisted
   2) Symptoms: adults--decreased appetite, no cud chewing, decreased milk production, abdominal pain, a sprung rib cage, a temperature; calves--chronic bloating
   3) Prevention: good feed management
      (a) Do not change feed rations too rapidly just before, or immediately after, parturition.

(b) Make sure the dietary fiber needs are met in both quantity and fiber size.
(c) With simple displaced abomasum, laxatives or antacids can be effective, as can a "rolling" technique.
(d) Surgery is usually required for valuable cattle with LDA, RDA, or abomasal volvulus.

c) Vagus indigestion
1) Occurs when the main nerve (vagus nerve) controlling gastrointestinal movement (motility) is damaged or pinched
2) Symptoms: lack of appetite, lack of intestinal sounds, death
3) Treatment: recovery time or veterinary treatment

d) Extreme wear or loss of teeth
1) Can occur very rapidly, depending on the geographic region and feeding practices
2) Causes: age and some diseases, primarily nutrient deficiencies or excesses of calcium, phosphorus, and Vitamins D and A

e) Intestinal tortions, intussusception, and hernias
1) Symptoms: loss of appetite, blockage of the intestine, severe pain, and eventual death
2) Treatment: surgical intervention of a veterinarian

f) Prolapsed rectum
1) Causes: severe coughing/respiratory disease, diarrhea, or straining from constipation
2) Treatment: early recognition, surgical repair, and correction of the true cause

g) Hardware disease
1) Most frequently seen with dairy cows
2) Cause: swallowed debris, such as wire and nails
3) Symptoms: appetite loss, standing quietly with an arched back, impaired milk and other body functions, frequent urination, difficult breathing, slight temperature, grunting sound
4) Treatment: reducing feed intake, allowing the animal to remain still, broad-spectrum antibiotics, surgery
5) Prevention: magnet in reticulum
6) X-ray or exploratory surgery needed for definite diagnosis
7) Chronic cases difficult to diagnose because of confusing signs as the hardware moves through the body

h) Bloat
1) Occurs when the esophagus becomes blocked where it opens into the rumen; prevents the animal from burping normal rumen gases
2) Causes: something lodged in the esophagus, a cancerous growth, overeating of grain or legumes, or injury
3) Symptoms: off their feed, a ballooned left abdominal wall, or in severe cases, both sides of the abdomen and death
4) Treatment: passing a tube down the esophagus to release the gas, placing supporting medication into the rumen, surgical release of the gas

i) Ulcers
1) Can occur at any point along the gastrointestinal tract, although true stomach ulcers occur only in the abomasum
2) Causes: ingested toxins, viruses, or improper diets
3) Symptoms: poor appetite, dark feces if bleeding is occurring
4) Treatment: Supportive care and medication until the ulcers heal themselves

j) Toxins
1) Causes: contact with harmful manufactured sources or naturally occurring plants; orally or through the skin
2) Symptoms: vary from mild lack of appetite to severe constipation or diarrhea; can affect other organ systems

3) Treatment: (by veterinarian) antidotes, laxatives, and absorbents
4) Prevention: prevent exposure to toxins

k) Scours/diarrhea
1) Particularly deadly for calves younger than 10 days old
2) A veterinarian and diagnostic laboratory often needed for diagnosis
3) Causes
(a) Bacteria: *E coli, Salmonella,* and *Clostridium perfringens* types A, B, C, E
(b) Viruses: rotavirus, coronavirus, IBR, and BVD
(c) Contributing environmental factors, such as overcrowding, lack of colostrum, vitamin deficiency, and parasites
4) Symptoms: watery feces, weight loss, dry skin, weakness, depression, death
5) Treatment
(a) For dehydration, oral fluids, electrolyte therapy, antibiotics
(b) For sick calves, milk replacer, electrolytes, antibiotics
6) Prevention: cow vaccination against colibacillosis, *Salmonella, Clostridium,* rotavirus, coronavirus, IBR, and BVD so that antibodies will be passed on in colostrum; proper management; internal parasite control

3. Ask the students if GI diseases in horses are similar to or different from those in other livestock. Does the difference in digestive tracts have an effect on the types of GI diseases horses can contract?

What are the major GI diseases in horses, their symptoms, and treatments?

a) Equine colic
1) Most frequently seen gastrointestinal problem in horses
2) Not a single disease, but a symptom of pain in the abdomen
3) Causes: anatomical combined with poor management
(a) Anatomical: relatively small stomach; inability to vomit; and large, free-moving intestines
(b) Management: sudden changes in feeding or watering, too little forage, over-feeding/overwatering recently worked horses, working horses immediately after a full feeding, moldy grain or hay, and parasite buildup
4) Symptoms
(a) Mild pain: depression, pawing, lack of appetite, decreased bowel movement, yawning, looking toward flanks, excessive lying down, repeatedly getting up and down, frequent attempts to urinate, tail twitching, and kicking at the belly
(b) Moderate pain: rolling or thrashing dangerously, patchy sweating, rapid breathing
(c) Severe: rolling and thrashing uncontrollably, profuse sweating, and ignoring attempts at restraint
5) Treatment: keeping horse on its feet while waiting for the veterinarian, walking the horse slowly
(a) Medical colic: pain relievers, laxatives, withholding feed, general nursing care, follow-up exam
(b) Surgical colic: surgery, euthanasia

b) Diarrhea
1) Less common in horses
2) Causes: strongyle infestation, too much milk, bacterial and viral diseases, sudden changes in feed, or at the first normal heat after foaling
3) Treatment: antibiotics and medicines containing kaolin or pectin

F. Other activities

1. Have the local veterinarian bring in GI tracts from various species and talk about disease causes and treatments.

2. Bring in various products used in the treatment of GI diseases. Discuss how they work and how to use them properly.

G. Conclusion

The symptoms and causes of many digestive disturbances are very similar. Correct treatment depends on identifying the specific disease properly. Prevention, through proper sanitation and management, seems to be the key to controlling GI diseases.

H. Competency

Describe the diseases of the gastrointestinal tract in livestock.

Related Missouri Core Competencies and Key Skills

10B-5: Associate common human diseases with organs affected.
10D-1: Describe general ways in which human activities affect environmental quality.
10D-3: Identify problems caused by overpopulation and develop possible solutions.
10F-4: Identify the relationship among volume, pressure, and temperature of a confined gas.

I. Answers to Evaluation

1. d
2. b
3. a
4. c
5. a
6. d
7. a, c, d, f, g, h, i (question worth 10 points)
8. b, e, g (question worth 8 points)

UNIT IV - ANIMAL HEALTH

Name_____

Lesson 4: Diseases of the Gastrointestinal Tract

Date_____

EVALUATION

Circle the letter corresponding to the correct answer.

1. Which of the following destroys the lining of the small intestine and causes death in pigs?

   a. Scours
   b. Rumenstasis
   c. Salmonellosis
   d. TGE

2. Newborn animals should receive a full feeding of _____ during the first few hours of life to ensure defense against many diseases.

   a. Electrolytes
   b. Colostrum
   c. Milk replacement
   d. Water

3. Placing a magnet into the animal's reticulum can prevent which condition?

   a. Hardware disease
   b. Rumenstasis
   c. Colic
   d. Bloat

4. An animal doing complete, continuous rolls on its back shows signs of which disease?

   a. Diarrhea
   b. Constipation
   c. Equine colic
   d. Salmonellosis

5. For which disease is the cause unknown?

   a. Displaced abomasum
   b. Vagus indigestion
   c. Prolapsed rectum
   d. Bloat

6. Vaccination and antibiotics are effective against all but which cause of baby pig diarrhea?

   a. *E coli*
   b. TGE
   c. Rotavirus
   d. Coccidiosis

Complete the following multiple answer questions.

7. Which of the following contribute to colic in horses?

___a. Relatively small stomach
___b. *E coli* bacteria
___c. Inability to vomit
___d. Large, free-moving intestines
___e. Lack of colostrum
___f. Sudden changes in feeding or watering
___g. Too little forage
___h. Moldy grain or hay
___i. Parasite buildup
___j. Overcrowding

8. A cow is off her feed and her left side is swollen around the abdomen. Which are appropriate treatments?

___a. Isolation from the herd
___b. Passing a tube down the esophagus
___c. Plenty of fluids
___d. Broad-spectrum antibiotics
___e. Medication in the rumen
___f. Antidotes and absorbents
___g. In severe cases, surgery
___h. Euthanasia

UNIT IV - ANIMAL HEALTH

Lesson 5: Reproductive Diseases in Livestock

Objective: The student will be able to understand and describe the diseases of the reproductive system in livestock.

Study Questions

1. **What are the major reproductive diseases of swine, their symptoms, and treatments?**
2. **What are the major reproductive diseases of cattle, their symptoms, and treatments?**
3. **What are the major reproductive diseases of horses, their symptoms, and treatments?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 5: Reproductive Diseases in Livestock

TEACHING PROCEDURES

A. Review

Review previous lesson on the diseases that affect the gastrointestinal tract in livestock.

B. Motivation

Why is it important to know reproductive diseases in livestock? People in the livestock industry are well aware of the economic importance of preventing reproductive diseases in livestock. Reproductive diseases can cause major losses in a single livestock operation, as well as the entire livestock industry. To keep losses from occurring, a producer must be aware of symptoms, preventive measures, and treatments. Quick isolation of infected animals helps prevent spreading of the disease. Good management and sanitation practices are effective preventive measures.

C. Assignment

D. Supervised study

E. Discussion

1. Abortions in animals represent genetic and economic losses and frequently cause a serious disposal problem, especially if the abortion resulted from an infectious disease. Abortions can be caused by thousands of factors, so diagnosis of the cause of an abortion can be very difficult. The diagnostic success rate for abortion is only about 30 percent. Researchers say abortion losses of 2-3 percent can be tolerated without undue concern in well-managed livestock operations. See if students can come up with some major reproductive diseases in swine.

   What are the major reproductive diseases of swine, their symptoms, and treatments?

   a) Pseudo-rabies
      1) Description - Pseudo-rabies is an acute, frequently fatal disease occurring in all ages of swine. The most susceptible population is less than two months of age. This disease is usually spread by a virus present in the sow's milk or in the boar's semen.
      2) Symptoms - Young pigs usually die right away or are aborted by the sow. Older pigs or weaning-age pigs show signs of fever, incoordination, walking sideways, tremors, mouth frothing, eye discharge, and sometimes convulsions. Vomiting, diarrhea, and death will soon follow. Adult swine show signs of fever, vomiting, muscle spasms in limbs, convulsions, or intense itching. Adults might also have respiratory problems. The most prominent sign in females is aborting their young.
      3) Prevention - The only preventive measure is to test incoming stock for pseudo-rabies. Any stock that tests positively for pseudo-rabies must be destroyed.
      4) Treatment - The only treatment for positively tested stock is to destroy those animals to prevent further spreading of the disease.

   b) Leptospirosis
      1) Description - Leptospirosis affects all populations of swine. It is transmitted through wallowing in muddy areas infected by contaminated urine. Other methods of transmission are infected dead pigs and outside animals entering confined

quarters. The organism usually confines itself to the area of the bladder. The organism can survive for several months in stagnant waters. Infection usually occurs through the nasal and oral passages by nosing at urine or eating contaminated fetus, food, soil, or water.

2) Symptoms - Reproductive disorders usually show as abortions, infertility, stillbirths, fever, reduced milk, and neonatal mortality. Acute cases show signs of dullness, diarrhea, hindquarter weakness, incoordination, staggering gait, and stiffness of neck.

3) Prevention - Vaccinations are available to prevent leptospirosis. Vaccinations for sows should be done prior to mating and just before farrowing. This method is very beneficial for confined farrowing operations. Outside animals entering the herd should be isolated, vaccinated upon arrival, and again 4-6 weeks after they enter the herd. Pigs should be vaccinated at weaning and again 4-6 weeks later. Good management practices, such as cleaning pens and eliminating stagnant waters and rodents, are good preventive measures.

4) Treatments - Feed additives can eliminate carrier animals by treating the entire herd for 8-11 days. There are several drugs available that are effective for treating infected animals.

c) Brucellosis

1) Description - Brucellosis attacks all breeds, classes, and ages of swine. There is no lasting immunity for brucellosis; infected animals that recover can be reinfected with the disease later in their lifetime, usually 6-12 months after recovery. There are several modes of infection. The germ can be present in the urine of both sows and boars, in semen, vagina discharges, food and water troughs, sow's milk, and even in the soil. The germ enters the body through the mouth from any of the above sources. It can be transferred from pen to pen by human clothing, boots, farrowing crates, and feed buckets. Transmission of brucellosis can also occur when hogs eat or come in contact with infected, aborted fetuses. The disease can be readily transferred from the boar to sow during mating.

2) Symptoms - In boars, one or both testicles appear swollen. If not caught early enough, the boar generally becomes impotent. In the female, symptoms appear in their offspring, not in the sow herself. Since each fetus has its own placenta, some pigs are born normally developed, but others might be born dead and underdeveloped. Abortions can occur but are rare in swine. Once an abortion occurs, the sow generally eats her young.

3) Prevention - Isolating and testing sows that have abortions or stillborns is a good preventive measure. Good sanitation practices, such as cleaning and disinfecting farrowing crates, help prevent brucellosis. Always isolate and test outside animals coming into the herd to ensure containment of the disease.

4) Treatment - No drugs are available at this time to effectively treat brucellosis, so destroying all animals that test positive for it is the only treatment.

d) Parvovirus

1) Description - Parvovirus is probably the most infectious virus that affects swine because of its resistance to heat, cold, acidity, alkalinity, and disinfectants. Parvovirus affects all breeds, classes, and ages of swine. Infection can occur venereally, by inhalation, and by ingestion. Pigs affected by parvovirus in their adolescent years will probably develop a natural immunity for the remaining years of production.

2) Symptoms - Parvovirus usually appears in the form of reproductive problems in swine. Sows will have problems conceiving, stillbirths, reduced litter sizes, and mummification of fetuses. Boars will have infertility problems.

3) Prevention - It is important to isolate animals that are suspected of infection and outside animals entering the herd for testing. Infected animals generally shed the

virus in their fecal matter, so good sanitation practices are also important. There are vaccinations available for parvovirus.

4) Treatment - Isolating and vaccinating infected animals is usually the best form of treatment for parvovirus.

2. See if students can come up with some major reproductive diseases in cattle.

What are the major reproductive diseases of cattle, their symptoms, and treatments?

a) Brucellosis
   1) Description - Brucellosis is a very contagious bacterial disease in cattle. Brucellosis is an important livestock disease because it can be transmitted to humans very easily. The bacteria enters the body through the mouth or venereally. Transmission occurs by licking genital organs, infected fetus, infected placenta, or by licking vaginal discharges. Transmission can also occur during natural servicing of females, but this is very rare. Females are more susceptible than males, and older animals seem to be more susceptible than younger animals. Time of the year, climate, and weather have little influence on the brucellosis bacteria.
   2) Symptoms - Abortions in cattle are a significant sign of brucellosis, but not all infected females abort their fetuses. Other symptoms are weak calves at birth, retained placenta, and vaginal discharge. These symptoms lead to a period of infertility for both the female and male. An infected male will usually have a reduced sex drive and enlargement of one or both testicles.
   3) Prevention - Calf vaccination and good sanitary practices are vital in preventing brucellosis from entering the herd. Annual brucellosis testing of the herd is a good preventive measure.
   4) Treatment - Isolating infected animals is vital in preventing the disease from spreading. All infected animals must be destroyed.

b) Mastitis
   1) Description - Mastitis is more common in dairy than in beef cattle because dairy cattle come in contact with more outside sources. All breeds of dairy and beef cattle are susceptible to this disease. It is considered a reproductive disease because it appears only after parturition. Infection usually occurs by bacteria transfer from the milker's hand, milking equipment, flies, or by lying on infected ground. The bacteria enters the body through the hole in the end of the teat. Cows that have been affected by the disease will not become immune to the disease; it can reoccur again and again.
   2) Symptoms - A true sign of mastitis is changing the true nature of milk. Infected milk has thick, white, pus-like clots in it. Clots resemble paper spit-wads. The milk usually becomes paler and thinner. The infected milk has a very unpleasant odor since it is infected with pus. The udder becomes hot, tense, and painful for the animal. The udder might also develop lumps that can be felt by the producer.
   3) Prevention - There are several teat dips available to prevent mastitis. Dipping the teats after milking is a good management practice. Good cleaning practices for the milking parlor and milking equipment are also good preventive measures.
   4) Treatment - There are several drugs available for treating mastitis. These drugs should be administered to the infected animal until the animal is fully recovered. Infected milk must be disposed of properly. There is usually a waiting period until the milk returns to the herd's milk supply.

c) Metritis
   1) Description - Metritis means inflammation of the uterus or breeding bag. Metritis is not a specific disease but a condition or symptom of a variety of bacterial diseases. Infection can occur venereally, through contaminated obstetrical equipment (calf pullers and chains), by human contact after working with infected

animals, and improper clean-up. Afterbirth removal by manual, rough, or early means are predisposing causes for metritis. The retained placenta acts as a wick for infection to the uterus.

2) Symptoms - Females affected by metritis have inflammation of the mucus membrane lining of the uterus. This inflammation creates outward signs of vaginal discharge in the form of excess mucus, pus flakes, or excess pus. Breeding problems usually occur, such as conception problems, missed heat cycles, and a fertilized egg that cannot attach itself to the uterus wall. These problems occur because of inflammation in the uterus. Bulls are usually unaffected by the disease but can be carriers.

3) Prevention - Good sanitation and feeding practices are preventive measures. If an outbreak occurs, isolate infected animals; make sure equipment and clothing are cleaned after working with infected animals. An outbreak of metritis is more likely to occur in confined areas like calving barns. (There is a higher concentration of infectious diseases in confined areas than in the outside environment.)

4) Treatment - There are several drugs available for treatment of infected females. Consulting the veterinarian will produce the most effective results.

d) Leptospirosis

1) Description - Leptospirosis affects all classes, breeds, and ages of cattle. Like swine, the disease is transmitted through infected urine. Transmission generally occurs by inhaling infected urine droplets that are present in the air. Animals that recover from leptospirosis generally develop a high resistance to reinfection. Low-lying ground with swampy conditions and stagnant puddles of water are predisposing causes for leptospirosis.

2) Symptoms - Acute symptoms of leptospirosis are fever, depression, failure to eat, and reduced milk production. Some chronic symptoms are abortions, breeding difficulty, death, and retained placenta.

3) Prevention - The best form of prevention is to isolate infected animals from the rest of the herd. Be aware of any stagnant bodies of water if there is an outbreak of leptospirosis in the herd. There are vaccinations available for prevention of this disease.

4) Treatment - Several drugs are available for treatment of leptospirosis. It is best to consult a veterinarian for effective treatment.

3. See if students can come up with some major reproductive diseases in horses.

What are the major reproductive diseases of horses, their symptoms, and treatments?

a) Metritis

1) Description - Metritis affects all classes and breeds of breeding stock in horses. The most susceptible population is breeding mares. Infection can occur venereally, through contaminated obstetrical equipment (such as foal pullers and chains), by human contact after working with infected animals, and improper clean-up. The retained placenta acts as wick for infection to have a direct route to the uterus.

2) Symptoms - Symptoms of metritis are more difficult to detect than other diseases because animals usually appear to have breeding problems. Mares show no signs of vaginal discharge. The only signs are failure to conceive or maintain pregnancy. Other signs of metritis are repeated service to a known fertile stallion. Sometimes a mare appears to have conceived by missing a heat cycle, but after 2-3 months later a fetus is not found because the fertilized egg could not attach itself to the uterus wall.

3) Prevention - If an outbreak occurs, isolate infected animals and make sure equipment and clothing are cleaned after working with infected animals.
4) Treatment - The following are effective treatments for metritis: local antibiotic therapy, systemic antibiotics, topical antiseptic therapy, uterine flushes, plasma infusion, and a combination of plasma infusions and antibiotics.

b) Fescue toxicity
1) Description - Fescue toxicity affects female breeding stock in horses. Infection occurs when gestating mares eat fungi-infected fescue grass. By eating infected fescue, production of the hormone prolactin is reduced. Prolactin reduction decreases or eliminates milk production in the mare. This process generally takes place in the last 60 days of gestation.
2) Symptoms - Fescue toxicity is generally too hard to detect until it is too late, but there is one indication that can lead to the detection of it. If the mare was on a fescue diet and gestating, the lack of udder development is a good indication of fescue toxicity. After foaling, signs of fescue toxicity are stillborns and thick, discolored placenta.
3) Prevention - A good preventive measure is to pull gestating mares off their fescue diet 60 days prior to foaling to reduce fescue toxicity chances.
4) Treatment - Since fescue toxicity is not an infection, treatment for the disease is not necessary to aid in recovery. Good management practices are the most effective way to prevent fescue toxicity.

F. Other activities

A local veterinarian could talk to students about setting up health programs necessary for a healthy herd.

G. Conclusion

It is important for livestock producers and others in the livestock industry to understand the impact of reproductive diseases. The producer is the first step in detection, prevention, and treatment of reproductive diseases, so it is vital that a producer understand the impact of health on the herd.

H. Competency

Describe the diseases of the reproductive system in livestock

I. Answers to Evaluation

1. b
2. a
3. d
4. b
5. c
6. d
7. b
8. c
9. d
10. b
11. a, b, e, f, g (question worth 10 points)
12. b, c, d, g, h (question worth 10 points)
13. a, d, e (question worth 10 points)

UNIT IV - ANIMAL HEALTH Name_____

Lesson 5: Major Reproductive Diseases in Livestock Date_____

EVALUATION

Circle the letter that corresponds to the best answer.

_____ 1. Which pork reproductive disease is transmitted by inhaling infected urine droplets?

a. Pseudorabies
b. Leptospirosis
c. Brucellosis
d. Parvo virus

_____ 2. Which reproductive disease in cattle is the most infectious to humans?

a. Brucellosis
b. Mastitis
c. Metritis
d. Leptospirosis

_____ 3. A good preventive measure for fescue toxicity is to remove horses from a fescue diet _____ days before foaling.

a. 30
b. 45
c. 50
d. 60

_____ 4. White, pus-like clots found in milk are symptoms of what reproductive disease in cattle?

a. Brucellosis
b. Mastitis
c. Metritis
d. Leptospirosis

_____ 5. Which reproductive disease deals strictly with a cow's uterus or breeding bag?

a. Brucellosis
b. Mastitis
c. Metritis
d. Leptospirosis

_____ 6. Which reproductive disease is considered the most infectious viral disease in swine?

a. Pseudo-rabies
b. Leptospirosis
c. Brucellosis
d. Parvovirus

_____ 7. In swine, the destruction of infected animals is the only effective treatment for which two diseases?

a. Pseudo-rabies and leptospirosis
b. Pseudo-rabies and brucellosis
c. Parvovirus and brucellosis
d. Parvovirus and leptospirosis

_____ 8. Placenta removal before it is ready to be taken away, manual removal, and rough removal of placenta are predisposing causes for which reproductive disease in cattle?

a. Brucellosis
b. Mastitis
c. Metritis
d. Leptospirosis

_____ 9. What reproductive disease is likely when a mare appears to have conceived but has not formed a fetus three months later?

a. Leptospirosis
b. Brucellosis
c. Fescue toxicity
d. Metritis

_____ 10. Stagnant, infected bodies of water is a predisposing cause for which reproductive disease in swine?

a. Pseudo-rabies
b. Leptospirosis
c. Brucellosis
d. Parvovirus

Place a check by the appropriate symptoms for the following diseases.

11. What are the acute symptoms of leptospirosis in swine?

____ a. Dullness
____ b. Diarrhea
____ c. Retained placenta
____ d. Lumps in udder
____ e. Incoordination
____ f. Staggering gait
____ g. Stiffness of neck
____ h. Lack of appetite
____ i. Nervous disorders
____ j. Tail biting

12. What are the symptoms of mastitis in cattle?

____ a. Lack of appetite
____ b. White clots in milk
____ c. Unpleasant odor from milk
____ d. Lumps in udder
____ e. Diarrhea
____ f. Fever
____ g. Udder feels hot
____ h. Milk thinner in nature
____ i. Staggering gait
____ j. Respiratory problems

13. What are symptoms of fescue toxicity in horses?

____ a. Lack of development of udder
____ b. Diarrhea
____ c. Lack of appetite
____ d. Discolored placenta
____ e. Stillborns
____ f. Fever
____ g. Staggering gait
____ h. Dullness
____ i. Lumps in udder
____ j. Respiratory problems

UNIT IV - ANIMAL HEALTH

Lesson 6: External and Internal Parasites

Objective: The student will be able to describe the external and internal parasites of livestock and poultry.

Study Questions

1. **What are the major external parasites of livestock, their symptoms, and treatments?**
2. **What are the major internal parasites of livestock, their symptoms, and treatments?**
3. **What are the external parasites of poultry, their symptoms, and treatments?**
4. **What are the major internal parasites of poultry, their symptoms, and treatments?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 6: External and Internal Parasites

TEACHING PROCEDURES

A. Review

Review Lesson 4.

B. Motivation

Bring in pictures of internal and external parasites. Bring in products used in the treatment of internal and external parasites. Discuss what they are and what they are used for.

C. Assignment

D. Supervised study

E. Discussion

1. Discuss what some external parasites of livestock might be. Ask the students what products are used to control parasites in livestock. Are there any similarities in parasites of different species?

What are the major external parasites of livestock, their symptoms, and treatments?

a) Ticks
   1) Hosts - Ticks attack all classes of livestock but are of greatest concern to cattle and horse producers.
   2) Life cycle - After leaving the host, the adults lay eggs that hatch into larvae in 10-21 days to three weeks. The larvae become nymphs and attach to a host until they become mature adults, which range from a few days to several months, depending upon the species.
   3) Damage - The greatest damage to hosts by ticks is the sucking of blood, which can cause anemia, weight loss, and even death. They also leave a wound that encourages bacterial infection or other injury.
   4) Symptoms - Infestations are usually found by visual inspection.
   5) Control - Extreme temperatures and pasture rotation help control ticks. The most effective method of control is chemical treatment.

b) Louse
   1) Hosts - Lice are species specific, and only one species affects swine--the hog louse.
   2) Life cycle - The adult female glues her eggs to the hairs of the host. Hatching times range from 1-2 weeks, when the nymphs are produced. In 2-4 weeks, the nymphs become mature adults.
   3) Damage - Bloodsucking lice can cause the hosts to become anemic. Irritation and discomfort cause rubbing and scratching. This decreases feeding and grazing time, resulting in loss of gains, unthriftiness, and even death.
   4) Symptoms - The primary symptoms of lice infestations are rough hair coats, rubbing, and scratching.
   5) Control measures - Chemical control by pesticide sprays, dips, dust, and self-treatment devices are most effective.

c) Mite
   1) Hosts - Mites attack all classes of livestock.
   2) Life cycle - Mites spend their entire lives on the host. The adult female lays its eggs on the surface of the host's skin. The eggs hatch in approximately four days, and larvae emerge. The larvae molt, become nymphs, molt again, and become adults. The entire life cycle takes 12 days or less.
   3) Damage and symptoms - Hair falls out and the skin becomes rough and crusty.
   4) Control measures - Mites can be chemically controlled. Animals having this pest are placed under quarantine.

d) Screwworm
   1) Hosts - The screwworm affects all livestock. Usually, infestation is only through wounds; however, some infestations have been found without wounds.
   2) Life cycle - The screwworm is the larvae stage of the blowfly. It feeds on living flesh for 5-7 days, drops to the ground, and pupates.
   3) Damage - The larvae or maggots live on live flesh and can cause weight loss, permanent injury, or even death.
   4) Symptoms - The primary signs of screwworms in a wound are an unpleasant odor, enlargement of the wound, and seepage of blood serum from the wound.
   5) Control - Sprays are available for the treatment of screwworm infestation.

e) Heel fly or cattle grub
   1) Hosts - Cattle are the primary hosts for the cattle grub; however, they have been found with other species.
   2) Life cycle - The adult fly lays eggs on the hairs of the legs and lower parts of the host's body. The eggs hatch into larvae that penetrate the hair follicles and enter the animal's body. During a period of months, the larvae migrate through fleshy tissues of the animal's body until they reach the back.
   3) Damage - The primary damage is to the hides because of decreased values from the holes. During fly strike, when flies attack cattle in swarms, cattle are likely to hurt themselves as they try to get away from the flies. There is also damage to meat that must be trimmed away as waste.
   4) Symptoms - The presence of the host fly is evident during egg laying. There is visible swelling of the grubs once they arrive in the animal's back.
   5) Control - The best control method is to use systemic insecticides before heel flies reach the animal's back.

f) Horn fly
   1) Hosts - Cattle are the main hosts, but horn flies will attack other species.
   2) Life cycle - The adult female lays her eggs in manure, where they hatch in nearly 24 hours. The larvae mature in 5-10 days and then pupate. Young flies emerge from the pupae in 3-7 days and become adults in a few days.
   3) Damage - The adult fly bites and sucks blood from the head, neck, back, and belly of cattle. The biting transmits disease, annoys the animal, and indirectly causes weight loss.
   4) Symptoms - Horn flies are easily seen on infested animals. Unless they are controlled, horn flies will cover the backs and necks of cattle during the spring and summer.
   5) Control - Chemical control is the best method. Feed additives and ear tags containing insecticides are other available methods for controlling horn flies.

g) Other flies
   1) Hosts - Flies are parasites of all classes of livestock.
   2) Life cycle - The adult female lays eggs in manure, debris, and other dead and decaying organic matter. The eggs hatch into larvae in approximately 24 hours. The larvae mature and pupate in 5-10 days. Flies emerge from the pupae in 5-7 days and become adults in only a few days.

3) Damage - Besides biting, sucking blood, and transmitting diseases, flies annoy animals, indirectly causing lowered feed gains and weight loss.
4) Symptoms - Flies are easily seen, and heavy infestations are common around lots and barns.
5) Control - Most flies can be controlled with chemical sprays and dusts or feed additives. Because most species build up an immunity to nearly all chemicals, rotation in the use of chemicals is recommended.

h) Nose bots
1) Hosts - The nose bot is a parasite of horses and sheep and is closely related to the heel fly.
2) Life cycle - The adult fly emerges from the pupae, which lies dormant in feces and other debris until the first warm days of spring, late summer, or early fall. While grazing, the animals rub their noses against the ground; the fly deposits the eggs on the nose and chin of the animals.
3) Damage - Large infestations of the bot in the animal's stomach reduce digestion and usually leave an ulcerated area.
4) Symptoms - The presence of the adult fly is very obvious because of the irritation it causes the animals.
5) Control - Chemical control through deworming is the only method of control.

2. Discuss what some internal parasites of livestock might be. Ask the students about products used to control parasites in livestock. Are there any similarities in parasites of different species?

What are the major internal parasites of livestock, their symptoms, and treatments?

a) The internal parasites which affect livestock are divided into three major groups.
1) Roundworms
2) Flukes
3) Tapeworms

b) Roundworms - From an economic standpoint, roundworms are the most important parasites. There are many types that affect almost every species of livestock. Although there are species which attack every system in the body, the ones of greatest concern are found in the digestive system (mostly the stomach and intestines).
1) Stomach worms - There are several species of stomach worms, but the twisted stomach worms and the brown stomach worms are most important.
(a) Hosts - Stomach worms are found in all classes of livestock but commonly affect cattle, sheep, and horses.
(b) Life cycle - In the adult stage, stomach worms live as bloodsucking parasites attached to the stomach wall. The eggs pass from the host in the feces and hatch into larvae in 15-20 days, depending on temperature and humidity. The larvae crawl up a blade of grass, are eaten by the animal, and travel to the stomach lining until they mature.
(c) Damage - While penetrating the stomach lining before maturing, they cause severe damage by reducing nutrient digestion and producing poisons. Young, undernourished, or diseased animals are hardest hit.
(d) Symptoms - The most common symptom is anemia. In light infestations, the animal will have a dull hair coat, an unthrifty appearance, and sometimes scours. In severe infestations, there will be persistent scouring, weight loss, anemia, weakened condition, and possibly death.
(e) Control - Sanitation and pasture rotation are good control measures. Chemical dewormers are used in treating infested animals. The type of dewormer used is dependent upon the class of livestock. Drenches and injectable dewormers are most often used in cattle and sheep. Feed and water additives are generally used for swine. Liquid dewormers,

administered by tubing, are the most effective treatment for horses. Feed additives are also very effective.

2) Strongyles - There are several species of strongyles (bloodworms) that normally inhabit the small intestine and are also found in the abomasum of ruminants.
   (a) Hosts - Strongyles attack all species and have a greater effect on young animals of each species. After cattle and horses reach an age of 4 or 5 years, they build up a partial immunity and are less affected.
   (b) Life cycle - Adult stage strongyles live as bloodsucking parasites attached to the lining of the intestines. Eggs pass from the host in the feces and hatch into larvae within 5-20 days, depending upon temperature and humidity. The larvae then attach to a blade of grass, are eaten by an animal, pass through the stomach, and attach to the wall of the intestine. The larval stage strongyles can live for months in the grass before being eaten. Larvae pass through the arteries and other internal organs, sometimes causing irreparable damage.
   (c) Damage - Strongyles (bloodworms) are the most detrimental of all internal parasites. Besides sucking blood, which results in anemia, their presence and the scar tissue they leave greatly reduce digestion in the intestines. They are the major cause of colic in horses. In chronic infestations, their presence results in unthriftiness, poor feed conversion, weakened condition, and even death in all livestock.
   (d) Symptoms - The most common symptom is anemia. In moderate and severe infestations, animals have weight loss, rough hair coats, scouring, loss of appetite, colic, and weakness.
   (e) Control - Sanitation and pasture rotation are effective in helping control strongyles. The use of chemical dewormers in a regular deworming program is the best method of control. In cattle and sheep, deworming, boluses, drenches, and injectable dewormers are the most effective. For swine, water and feed additives are most often used. For horses, tubing at regular intervals plus feed dewormers between tubings give the best results.
3) Ascarids - Largest of the roundworms
   (a) Hosts - Primarily, ascarids prey on cattle, sheep, hogs, and horses. Younger animals are most often affected.
   (b) Life cycle - Eggs are passed in the feces and contaminate pastures, lots, and stable areas, where they are ingested by susceptible hosts. The larvae burrow into the intestine wall and migrate through the liver, heart, and finally the lungs, where they are coughed up and swallowed. After reaching the intestines the second time, they develop into the adult stage, where they reach a length of 8-15".
   (c) Damage - Affected animals can develop pneumonia and lung damage due to the larval migration through the lungs. Unthriftiness, weight loss, and colic due to intestinal blockage are common in heavy infestations.
   (d) Symptoms - Weight loss, dull hair coat, general unthriftiness, and colic are noticed.
   (e) Control - Generally, ascarids are controlled by the same means as other stomach and intestinal roundworms--pasture rotation, sanitation, and deworming programs.
4) Pinworms - Small roundworms usually found in the colon or rectum of horses
   (a) Hosts - Predominantly, pinworms are a parasite of horses.
   (b) Life cycle - Adult females lay eggs around the anus of the horse. These eggs drop off and contaminate pastures, stables, and watering and feeding areas. After eggs are ingested by the host, they pass to the colon and rectum to mature.

(c) Damage - Damage by pinworms is minor. However, they do cause severe irritation around the tail area, which causes horses to rub their tails.

(d) Symptoms - Tail rubbing is the most noticeable symptom. Also, white scaly deposits are visible around the anus.

(e) Control - Chemical worming programs used to control other species of roundworms will control pinworms. Sanitation measures around barns and lots are effective in reducing infestations.

5) *Habronema* - This species affects the host in two stages.

(a) Host - The horse is the major host of the *Habronema* stomach worm, but the house fly is an intermediate host.

(b) Life cycle - The adult stage is found in the horse's stomach, where little damage occurs other than an occasional tumor. Larvae are passed in the feces, which are ingested by house fly maggots. They remain in the fly when it emerges from the pupal stage. The larvae of the *Habronema* are swallowed, deposited on the lips of the horse by the fly, and mature in the horse's stomach.

(c) Damage - Real damage of the *Habronema* does not involve its normal life cycle. If the larvae is deposited on an open wound, a summer sore develops. These summer sores are difficult to heal and are the result of the migration of *Habronema* larvae throughout the wound. They can permanently disable or disfigure horses. These sores also develop around the medial canthus (corner of the eye nearest the bridge of the nose), especially in stabled horses.

(d) Symptoms - A summer sore is easily detected by a seepy, hard-to-heal crusty sore. In the eye there is excessive tearing and running, which later forms an open sore. The larvae can be seen upon close inspection.

(e) Control - As with other roundworms, disruption of the life cycle is necessary. The best control is a regular deworming program. Sanitation is important, along with a fly control program in and around the stable area.

6) Lungworms - These roundworms affect the circulatory system and lungs.

(a) Hosts - Lungworms affect all species of livestock.

(b) Life cycle - Eggs are laid in the lungs, then coughed up and swallowed. The eggs hatch in the stomach or intestine and the larvae are passed in the feces. After a period of development in moist earth or water, the larvae are ingested by the host and pass to the intestine. There, they burrow through the intestinal wall into the lymph nodes and are carried to the lungs, where they mature into the adult stage.

(c) Damage - In heavy infestations, there can be mechanical blockage of the lungs, causing a collapse of the infected area. This furnishes an ideal location for the invasion of other organisms. They can also cause blockage of the windpipe and bronchia.

(d) Symptoms - Coughing is the first indication of this parasite, and it is accompanied by faster and more forceful breathing. In severe cases, the animal breathes with its mouth open and its tongue protruding. The animal is reluctant to move, usually develops a fever, goes off feed and water, and becomes gaunt.

(e) Control - Sanitation and pasture rotation are the best control practices. Chemical control is relatively effective.

c) Tapeworms - Tapeworms are far less important than roundworms.

1) Broad tapeworm

(a) Hosts - The broad tapeworm is a parasite of all classes of livestock, as well as humans.

(b) Life cycle - The adult lives in the small intestine, where it can reach a length of 10' or more. Tapeworm segments containing eggs break off continuously

and pass out in the feces. The eggs are eaten by the oribatid mite, which lives in grass and weeds and serves as an intermediate host. The eggs develop in these mites, then are eaten by livestock and hatch in the small intestines. They feed on foodstuff eaten by the animal and grow to maturity.

(c) Damage - There is no physical damage to the host. However, the tapeworm is in competition with the host for foodstuff.

(d) Symptoms - Unthriftiness, loss of weight, diarrhea, and emaciation are the major symptoms.

(e) Control - Chemicals can rid the host of tapeworms.

2) Beef tapeworm - Although not a serious cattle parasite, it is a serious parasite of humans.

(a) Host - Although the beef tapeworm is a parasite of cattle, humans are the necessary intermediate host.

(b) Life cycle - Adult beef tapeworms only live in humans and can reach a length of 25'. The eggs contaminate the feed of cattle and pass down into the intestines. There, the eggs hatch out, bore through the intestinal wall and lodge in a muscle, causing a cyst. Beef affected by these cysts are called measly beef. The parasite is then passed to humans when infected, undercooked beef is eaten.

(c) Damage - There is little economic damage to cattle by the parasite; however, it is a problem for humans.

(d) Symptoms - There are almost no visible symptoms in beef cattle except in the carcasses of slaughtered animals.

(e) Control - Since humans are the necessary intermediate host and the beef tapeworm is transferred through the meat, the best control is eating only well-cooked beef. People who raise or work around cattle should have themselves checked regularly.

3) Pork tapeworm - This tapeworm is the same as the beef tapeworm, except that the larvae live in the muscle tissue of pork.

d) Liver fluke

1) Hosts - The liver fluke is a parasite of cattle, sheep, goats, and humans. It is especially damaging to young animals.

2) Life cycle - The adult lives in bile ducts, where eggs are laid and pass down into the intestines and out in the feces. Eggs must land in water to hatch. The larvae that hatch from these eggs swim about seeking a snail, which is necessary for completing the liver fluke's life cycle. The larvae develop for a period in the snail, then emerge and attach to plants along the water. Livestock eat the water plants and become infested. The young flukes pass to the intestines and burrow through the abdominal cavity and into the liver, where they live principally on blood. Egg production begins about three months after entering the animal.

3) Damage - The fluke causes irritation, thickening of the bile duct, and fibrosis of the liver, making it unfit for human consumption.

4) Symptoms - The usual symptoms are anemia and weight loss. Highly infested animals might die.

5) Control - Pasture rotation and using water troughs help in control. The use of chemical treatment will kill adult flukes in the animal. Control of snails will break the cycle, but it is difficult to do.

3. Relate external parasites of poultry. Why do they differ from other livestock? Ask about products used to control parasites. Mites (including common chiggers) can be found on humans and other mammals.

What are the external parasites of poultry, their symptoms, and treatments?

a) Poultry producers lose millions of dollars annually to damage caused by external parasites. These parasites transmit pathogens or kill birds, decrease egg production, increase feed costs, reduce weight gains, and lower carcass quality.

b) Lice
   1) Lice are more abundant in summer than in winter.
   2) Lice are permanent parasites of their hosts. They spend all life stages on the same bird. Sometimes, they will pass from one bird to another, particularly from an older bird to a younger bird.
   3) Although lice eggs are laid singly, they can be abundant enough to form dense clusters on the fluffy area of contour feathers of badly infested chickens.
   4) Eggs cemented to the bird's feathers are oval, white, and sometimes beautifully ornamented with fine spines. Eggs hatch in a few days or weeks.
   5) Young nymphs immediately begin running about and feeding on the host.
   6) After a few weeks, they gradually become adult sized in form and color.
   7) All lice infecting poultry are sucking and chewing types.
   8) Lice irritate, cause weight loss, reduce egg production, decrease carcass quality, and can even kill birds.
   9) Several species of lice attack poultry. These include: body lice, head lice, wing lice, and fluff lice.

c) Mites
   1) Mites vary in size and structure. Poultry are susceptible to many types of mites.
   2) Mites usually occur on or under the bird's skin or feathers. A few can exist in body tissues, feather quills, or nasal and respiratory passages such as the air sac.
   3) Mites feed by piercing the bird's skin or tissue, sucking blood or body fluids, or by biting bits of skin or feathers.
   4) Mites slow the growth of birds, reduce egg production, lower vitality, damage plumage, and even kill birds.
   5) Much of the injury, consisting of constant irritation and loss of blood, is unapparent unless one examines the bird.

d) Ticks
   1) Several species of ticks affect poultry. These include the fowl tick, Lone Star tick, and Gulf Coast tick.
   2) The tick is a bloodsucker and injures poultry by transmitting disease, causing weight loss, lowering egg production, and causing skin blemishes that reduce market value.
   3) Ticks are difficult to eradicate. Houses and surrounding areas require thorough pesticide treatment.

e) Mosquitoes transmit poultry diseases, including malaria and fowlpox.

f) Many pesticides exist to control external parasites of poultry. Because the list of approved material changes rapidly, consult a poultry specialist for a recommendation.

g) Besides applying pesticides, producers can apply good management practices to their operation. Poultry houses and surrounding areas should be free of foreign materials, including manure and stagnant water.

4. Discuss internal parasites of poultry. Discuss similarities with parasites learned previously. Ask students about treatments.

What are the internal parasites of poultry, their symptoms, and treatments?

a) Various worms are major internal parasites of poultry. The number of worms that occur in any given bird depends upon the number of infectious eggs that the bird ingests. Worms do not multiply within the host bird.

b) Roundworms
   1) Large roundworms
      (a) Hosts - Chickens, turkeys, ducks, geese, and pigeons are susceptible to large roundworms.
      (b) Life cycle - The large roundworm has a simple and direct life cycle. The female lays thick, heavy-shelled eggs in the bird's intestines. The eggs are expelled in the feces. Poultry ingest the eggs, the eggs hatch, and the larvae develop into mature worms to complete the life cycle.
      (c) Symptoms and damage - Heavily infested birds exhibit droopiness, emaciation, and diarrhea. Very heavy infestations result in death. Primary damage is reduction in efficiency.
   2) Cecal worm
      (a) Hosts - These exist in the ceca of chickens, turkeys, and other birds.
      (b) Life cycle - A cecal worm's cycle is similar to that of the large roundworm.
      (c) Symptoms and damages - This common worm parasite does not affect the bird's health seriously. There are no marked symptoms or pathology occurrences due to the presence of cecal worms.
   3) Capillary worms
      (a) Hosts - Capillary worms occur in the bird's crop and esophagus.
      (b) Life cycle - The life cycle is direct or bird-to-bird. Worms lay their eggs in the bird's feces. Poultry eat the infected eggs.
      (c) Symptoms or damage - The worm produces a catarrhal inflammation and sometimes causes hemorrhaging. The bird's intestinal lining might erode extensively and result in death. Heavy infestations, especially in houses with deep litter, reduce growth, egg production, and fertility of birds.

c) Tapeworms
   1) These differ from roundworms because they are flat, ribbon-like, and segmented. They also differ from other worm parasites by having both male and female sexual organs on each segment.
   2) Worms attach to the intestinal lining by suction cups located on the worm's head.
   3) Symptoms of tapeworm infestation in poultry include weakness, unthriftiness, and poor growth. Diarrhea develops in some cases.
   4) Tapeworms affect young birds more severely than older birds.

d) Flukes
   1) Flukes are leaf-like flatworms that affect various parts of a bird's body.
   2) Flukes do not cause significant losses in poultry.

e) Prevention and control of worm infestations involves more than treatment. Proper diet, sanitation, and medication are essential.
   1) Poultry should receive feed rations adequate in vitamins A and B complex. Rations lacking these vitamins make poultry more susceptible to worm infestations.
   2) Sanitation practices are essential to prevention and control of worms. Remove poultry litter regularly. Avoid overcrowding birds.
   3) Treat infected birds with commercial drugs.

F. Other activities

Collect several feces samples from various species of livestock. Examine the samples under a microscope for types of internal parasites.

G. Conclusion

Proper management and sanitation is the best control measure for both internal and external parasites in all species of livestock and poultry. Proper identification of the parasites leads the way to appropriate prevention and treatment. There are many drugs available commercially to help control parasites.

H. Competency

Describe the major external and internal parasites of livestock.

Related Missouri Core Competencies and Key Skills

10A-6: Classify species associations into types of symbiosis: commensalism, mutualism, and parasitism

I. Answers to Evaluation

1. a, b, d-f, i, j (question worth 10 points)
2. a, b, e, f, i, j (question worth 10 points)
3. a, e, f, j (question worth 10 points)
4. e-h, j (question worth 10 points)
5. e
6. b
7. d
8. g
9. j
10. a
11. i
12. h
13. c

UNIT IV - ANIMAL HEALTH

Name_____

Lesson 6: External and Internal Parasites

Date_____

EVALUATION

Complete the following multiple answer questions by marking the correct answers.

1. Select the host, life cycle, damage, symptoms, and control characteristics for flies.

____ a. Flies can be controlled by ear tags containing insecticides.
____ b. Flies can be controlled by medicated feed additives.
____ c. Eggs hatch in approximately 12 hours.
____ d. A symptom is excessive watering of the host's eyes.
____ e. A symptom is loss of weight.
____ f. Fly damage is caused by diseases that are transmitted.
____ g. Cattle are exclusive hosts.
____ h. Hogs are exclusive hosts.
____ i. Damage occurs by annoying biting and sucking of blood.
____ j. For control, chemical rotation is recommended.

2. Mark the host, life cycle, damage, symptoms, and control characteristics for screwworms.

____ a. A symptom is an unpleasant odor.
____ b. Enlargement of an existing wound is a symptom.
____ c. Cattle are exclusive hosts.
____ d. Hogs are exclusive hosts.
____ e. Screwworms can be controlled by medicated sprays.
____ f. The adult screwworm is called the blowfly.
____ g. Larvae feed on living flesh for 10-12 days.
____ h. Larvae pupate in the animal.
____ i. Damage can result in the animal's death.
____ j. Permanent damage and weight loss can result.

3. For the broad tapeworm, check the host, life cycle, damage, symptoms, and control characteristics.

____ a. Humans can be a host.
____ b. Cattle are exclusive hosts.
____ c. Hogs are exclusive hosts.
____ d. Poor quality hides are a result.
____ e. A symptom is weight loss.
____ f. Diarrhea is a symptom.
____ g. Eggs hatch in the large intestine of the animal.
____ h. Eggs hatch in the animal's stomach.
____ i. Eggs are released from the body through urine.
____ j. Eggs are released from the body through feces.

4. Select the host, life cycle, damage, symptoms, and control characteristics of the lungworm.

____ a. Cattle are exclusive hosts.
____ b. Hogs are exclusive hosts.
____ c. Humans can be hosts.
____ d. Eggs hatch in the lungs.
____ e. Eggs hatch in the stomach or intestine.
____ f. Pasture rotation is a good form of control.
____ g. Good sanitation practices help control lungworms.
____ h. A symptom is coughing.
____ i. Diarrhea is a symptom.
____ j. Windpipe blockage can be a result.

Match the parasite on the right with the symptom on the left.

5. ____ The animal rubs and scratches its body excessively.

6. ____ A hard-to-heal, crusty sore is apparent in the eye's corner nearest the bridge of a horse's nose.

7. ____ White, oval eggs are cemented to the chicken's feathers

8. ____ Hair falls out and the skin becomes rough.

9. ____ Anemia, unthriftiness, and scours are apparent.

10. ____ Chickens have inflammation and hemorrhaging of mucous membranes.

11. ____ There is an unpleasant odor and enlargement of a wound.

12. ____ The horse rubs its tail excessively, and white, scaly deposits appear on the tail.

13. ____ There is a visible swelling on the back of cattle where these are present.

a. Capillary worm
b. *Habronema*
c. Heel fly
d. Lice
e. Louse
f. Lungworm
g. Mite
h. Pinworm
i. Screwworm
j. Stomachworm

UNIT IV - ANIMAL HEALTH

Lesson 7: Quality Assurance Programs

Objective: The student will be able to understand and describe animal health quality assurance programs.

Study Questions

1. **What is the pork quality assurance program?**
2. **What is the beef quality assurance program?**
3. **What is the dairy quality assurance program?**

References

1. Student Reference

UNIT IV - ANIMAL HEALTH

Lesson 7: Quality Assurance Programs

TEACHING PROCEDURES

A. Review

Review previous lesson on external and internal parasites of livestock.

B. Motivation

How safe are the foods we eat? How are the foods we eat regulated? Livestock associations have developed programs to ensure quality in animal products. Quality animal products start on the farm with the producer. Producers should be responsible for their products. This responsibility will instill consumer confidence in animal products and (hopefully) increase demand for these products.

C. Assignment

D. Supervised study

E. Discussion

1. Ask students if they know what the pork quality assurance program is and how it helps the swine industry.

What is the pork quality assurance program?

a) The pork industry's Quality Assurance Program has three levels. A swine producer interested in the Quality Assurance Program can request information about levels I and II from the National Pork Producers Council. The producer must read the information in the booklet and then take the evaluation at the end. Once the understands the idea of quality assurance, he/she sends the self-addressed card back to the NPPC, which sends the level III booklet. The producer must follow guidelines in the level III booklet to qualify for the "Quality Assurance Program."

b) Level III: Ten critical control points for "Quality Assured Pork Production"

1) Establish an efficient, effective herd health management plan. A swine producer should provide a clean, healthy environment, as much as possible. A checklist helps ensure management practices are in line for a healthy herd. The herd health management plan also sets up a vaccination program and compares the herd to recent trends in the swine industry. The herd health management plan should be completed in the presence of the presiding veterinarian.

2) Establish a valid veterinarian/client/patient relationship. The veterinarian/client/patient relationship exists when the following conditions are met:

(a) When the client or swine producer agrees to the instructions provided by the veterinarian on animal health and medical treatments.

(b) Veterinarian has sufficient knowledge of client's livestock to make proper judgments on medical treatments.

(c) Veterinarian is readily available for follow-up evaluation on infected livestock to observe any adverse conditions that still exist.

3) Store all drugs correctly. Always follow label instructions and pay close attention to expiration dates. If the label reads, "use the entire bottle," do so or discard. Store leftover medications in a cool, dry, and dark place, preferably in a

refrigerator. A pick-up dashboard is unacceptable. Clean syringes and discard used needles. Do not store medications in syringes. Keep medications out of reach of children. Keep water or feed additives dry to prevent caking or clumping.

4) Use only FDA-approved OTC (over-the-counter) or Rx (prescription) drugs with professional assistance. Remember, prescription medications can be administered only by a licensed veterinarian. Over-the-counter medications can be administered by anyone after carefully reading label directions. A swine producer must use only FDA-approved drugs whether the drugs are prescription, extra label, or OTC medications. (Extra label medications require extra instructions from the vet.) The producer must follow the guidelines on dosage, withholding times, mixing, safety, and efficacy. Producers are discouraged from buying unapproved FDA medications and drugs from uninformed suppliers.

5) Administer all injectable drugs and oral medications properly.
   - (a) A swine producer must know the following about administration of injectables:
     - (1) Use smallest recommended needle to lessen stress, minimize tissue and skin damage, and reduce leakage.
     - (2) Know the four types of delivery systems for injectable medications:
       - i) Intramuscular (IM): in the muscle
       - ii) Subcutaneous (SQ): under the skin
       - iii) Intraperitoneal (IP): in the abdominal cavity
       - iv) Intravenous (IV): in the vein
     - (3) Are injections ever given in the muscle of the ham?
     - (4) Are syringes adjusted correctly to give proper dosages?
     - (5) Are label directions followed for quantity of medication and site selection?
     - (6) Are animals restrained to prevent needle breakage and inappropriate dosages?
   - (b) A swine producer must know the following about administering water medications:
     - (1) When are water medications used?
     - (2) How are medicators calibrated?
     - (3) How often are medicators calibrated?
     - (4) Where are medications stored?
     - (5) How are lines flushed, if medications are used?
     - (6) Are medications mixed daily, and is consumption monitored?
     - (7) What is the recording system for water medications?
   - (c) If the producer cannot answer the previous questions correctly, he/she must seek assistance from the veterinarian.

6) Follow label instructions for use of feed additives. If a swine producer cannot answer the following questions correctly, he/she should seek assistance from the veterinarian.
   - (a) When is the last time the mixer or scale was calibrated? What is the period the owner's manual recommends?
   - (b) Are written records kept on calibration dates?
   - (c) When is the last time a feed analysis was done to check mixer accuracy?
   - (d) How often is the mixer checked for wear?
   - (e) How often is the mixer or mill cleaned?
   - (f) How are spills of medicated feeds handled?
   - (g) Is the mixer flushed after mixing medicated feeds?
   - (h) How are feed additives stored?
   - (i) Are label directions and withdrawal times followed carefully?

7) Maintain proper treatment records and adequate identification of all treated animals. A swine producer is responsible for keeping accurate records on all

health-related events associated with livestock. These records must include the identification of animals, what medications were administered, times treated, and withdrawal times.

8) Use drug residue tests when appropriate. The following situations should be considered for residue testing of swine:
   (a) Sows culled directly from the farrowing house for selling or marketing
   (b) Animals that received extra label medications
   (c) Swine shown at fairs or livestock shows
   (d) Pigs sold to individuals for roasting or slaughter at private slaughter houses
   (e) Newly purchased animals entering the herd, since it is rare to get treatment records on newly purchased animals
9) Implement employee/family awareness of proper drug use. Swine producers, employees, and family members who are involved with administering medications should be educated on proper administration techniques and product label information. Remember, the swine producer is ultimately responsible for those hogs!
10) Complete quality assurance checklist annually. The swine producer must complete the "Quality Assurance Checklist" annually with residing veterinarian. Consider this checklist as a minimum for swine health programs. This checklist assesses one's attitude, knowledge, and commitment to the pork industry.

2. Ask students if they know what the beef quality assurance program is and how it helps the cattle industry.

What is the beef quality assurance program?

a) Missouri Beef Quality Assurance Program is different from pork and dairy programs. The Missouri beef producers have set up a code of ethics for producing beef in Missouri. They have also set up beef management practices that should be followed by beef producers. Instead of 10 critical control points, the Missouri beef producers have set up five "beef tips" that producers should follow to ensure quality beef products. These tips follow.

b) When processing cattle
   1) Handle cattle in a way that minimizes bruising when administering injections.
   2) Avoid injecting cattle during wet weather to prevent contaminants from entering the injection site. Make sure injection site is dirt- and manure-free.
   3) Avoid using disinfectants when using any modified live virus product.
   4) Consider needle size when administering medications. Use smallest needle possible to prevent abscesses.
   5) Wet down work area around the chute to reduce dust or other foreign materials. Secondary infections could result from these materials entering the body at injection sites and open incisions.
   6) Select injection sites carefully. Consider injecting medications in the neck or lower thigh to prevent loss of expensive cuts of meat and market docks.
   7) Consider the volume of medication injected at one site. There are limitations on the amount given at a selected injection site.
   8) Know the differences between intravenous (IV), intramuscular (IM), and subcutaneous (SQ) injections. Inject these medications appropriately and follow label directions.
   9) Always place implants properly to avoid excess trimming of meat.
   10) Keep the working area, equipment, and employees clean to avoid any secondary infections when working with cattle.

c) Current Good Manufacturing Practices
   1) Buildings, grounds, work and storage areas, and equipment should be routinely maintained, metered, cleaned, and properly stored to ensure purity and intended potency.
   2) The manufacturer must keep accurate records of all laboratory tests done on product testing.
   3) Proper storage for different medications should be designed and maintained. Make sure proper clean-out procedures are followed with equipment to prevent contamination of products.
   4) Adequately label products to prevent mix-ups and assure correct labels are used on medicated feed.
   5) Keep production records on formulation, mixing dates, and shipping dates to ensure quality assurance.

d) Violations and inspections - Route of communication if residue is found
   1) If a residue is detected in an animal, the inspector will report the finding to the USDA's Food Safety and Inspection Service. A case number and identification number are assigned to the owner of the cattle. Then, the producer will be asked questions about the incident and why the animal(s) tested positively.
   2) Every time the producer ships animals to market, the USDA office should be notified of shipments. This monitoring will continue until the USDA office is satisfied that the occurrence will not happen again.
   3) The USDA office reports this incidence to the FDA. If the violation only occurs once, there will probably not be a visit. However, if there are several violations, there will be a visit to the facility. The FDA has the legal right to inspect any facility they want, and the producer's cooperation is critical.
   4) If one does not cooperate with the FDA during their inspection, the FDA can do the following:
      (a) Get a federal court injunction against the facility to halt all further activities.
      (b) Begin civil or even criminal prosecution against a producer for not complying with FDA regulations.
      (c) Seize all cattle that remain at the facility.
   5) Residue violations are critical. Producers must understand label directions concerning residue withdrawal times or pay the consequences.

e) Record keeping and inventory control
   1) Beef producers must keep accurate records on all aspects of animal health. To maintain market share and consumer confidence, producers must prove, through effective documentation, that they have tight control over risk factors.
   2) Animal health product inventories are also important for beef producers to control. Knowing the amounts of medications and the amounts used are vital to maintaining a tight control over risk factors.

f) Feed ingredients quality control - A beef producer must be aware of implications associated with residues found in feed ingredients. If a producer buys a load of medicated feed from a supplier and the cattle have a residue violation, who is responsible? If the producer does not have accurate records verifying that the load of medicated feed was received on a certain date, the producer is responsible. If the producer can produce accurate records of all incoming feed ingredients, the producer can pass the liability to the supplier.

3. Ask students if they know what the dairy quality assurance program is and how it helps the dairy industry.

What is the dairy quality assurance program?

a) Ten critical control points for "Quality Assured Dairy Production"
   1) Preventive herd health management program - A dairy producer should maintain the herd in a clean, healthy environment, as much as possible. The nutritional program should meet growth, maintenance, and lactation needs of animals. A producer should have the veterinarian implement a health program that encompasses preventive medical procedures and monitoring of reproductive status of breeding stock. Good management practices and health programs keep animals producing efficiently; therefore, they are less depends on medical therapy.
   2) Establish a valid veterinarian/client/patient relationship. The veterinarian/client/patient relationship exists when the following conditions are met.
      (a) The client or dairy producer agrees to the instructions provided by the veterinarian on animal health and medical treatment judgments.
      (b) Veterinarian has sufficient knowledge of client's livestock to make proper judgments on medical treatments.
      (c) The veterinarian is readily available for a follow-up evaluation on infected livestock to observe any adverse conditions that still exist.
   3) Dairy producers should use FDA-approved drugs, whether they are prescription or over-the-counter drugs. The producer must follow label guidelines on dosage, withholding times, mixing, safety, and efficacy.
   4) All drugs labels comply with "Grade A" milk control labeling requirement.
      (a) Over-the-counter drugs used by the dairy producer must have the following requirements specified on the label.
         (1) The manufacturer's label with indications for use on lactating cows and withholding time
         (2) The manufacturer's label with indications for use on non-lactating cows
         (3) If used according to label directions, no further instructions are needed.
      (b) Prescription drugs used by the dairy producer must have the following requirements specified on the label.
         (1) The prescribing veterinarian's name and address, as well as the manufacturer's label indicating milk withholding time on lactating cows.
         (2) The prescribing veterinarian's name and address, in addition to the manufacturer's label indicating use for non-lactating cows.
         (3) Prescription drugs are given by the veterinarian, and the medication should be used up totally. There shouldn't be any left over; if there is, return it to the vet. It should not be stored at the producer's facility.
      (c) Extra label drugs used by the dairy producer must have the following requirements specified on the label.
         (1) The veterinarian's name and address
         (2) Active ingredient
         (3) Directions
         (4) Cautionary statements as necessary
   5) All drugs are stored according to "Grade A" milk control labeling requirements. All drugs used in a dairy operation must be stored properly so they do not contaminate the milk supply, equipment, or utensils. Drugs used for lactating animals must be stored separately from drugs used for non-lactating animals. Drugs for lactating animals must be labeled for "lactating animals" and include the name and address

of the veterinarian if it is a prescription drug. Drugs for non-lactating animals must be labeled for "non-lactating animals."

6) All drugs are administered properly, and treated cows are properly identified. Before administering or dispensing drugs for any animal, a producer must consider the following.
   (a) What FDA drugs are approved for all classes of cattle on the farm? (Use label.)
   (b) Follow proper dosages.
   (c) Follow approved routes of administration.
   (d) Be familiar with and follow withholding times.

7) Treatment records are properly maintained, and treated animals are adequately identified. A producer is responsible for keeping accurate records on all health-related events associated with animals. These records must include the identification of animals, what drugs were administered, times treated, and withholding times.

8) Proper drug residue testing capabilities are readily available to producers for on- and off-farm usage. Producers must test milk and urine by appropriate tests for best results.
   (a) A dairy producer must consider the following factors to prevent drug residue from entering the milk supply or the slaughter residue testing.
      (1) Testing milk from sick animals that have received medication to detect any drug residue. Remember, withholding times on labels are based on healthy animals, so sick animals may have longer withholding times.
      (2) Testing milk on animals that have been administered extra label drugs, because extra label drugs officially do not have withholding times.
      (3) Testing dry animals returning to the milking herd that have been administered any type of drug during dry period
      (4) Testing any newly purchased lactating animals entering the herd, since it is rare to get treatment records on newly purchased animals
      (5) Testing the urine of any culled animals or calves weaned from treated cows headed for the sale barn. Urine testing detects any drug residues present in the animals. Calves can be infected by drinking milk from a treated cow.
      (6) Urine or milk testing on animals intended for slaughter to ensure no residue violations during slaughter
   (b) Precautions and misuses of residue testing
      (1) NEVER use residue testing to shorten withholding times.
      (2) NEVER test bulk tank milk to test milk from individual cows. Treated cows should be tested individually, not with the population.
      (3) NEVER add milk that has tested residue-positive to the bulk tank to dilute it.

9) Employees must show awareness and knowledge of proper drug use and methods to avoid marketing adulterated products. Producers and employees who are involved with administering medications should be educated on proper administration techniques and product label directions.

10) The dairy producer must complete an annual "Quality Assurance Checklist" with the residing veterinarian. Consider this checklist as a minimum for dairy health programs. Each dairy operation should be customized to fit the "Quality Assurance Checklist."

F. Other activities

1. When preparing to teach the lesson, some extra preparation might be needed. Possessing the actual assurance programs for each livestock class will greatly improve the presentation on this lesson. Most assurance programs have printed work sheets and checklists for producers to fill out. These work sheets and checklists would add another dimension to the lesson. Use the following addresses to write for information about quality assurance programs.

   a) National Pork Producer Council
      PO Box 10383
      Des Moines, IA 50306
      515/223-2600
   b) Missouri Cattlemen's Association
      PO Box 315
      Ashland, MO 65010
      573/657-2169
   c) Dairy Quality Assurance Center
      801 Shakespeare Box 497
      Stratford, IA 50249
      515/838-2793

2. Teachers can request "Handle with Care" video from Missouri Cattlemen's Association. The tape talks about quality assurance in beef and is 20 minutes in length.

3. Show the video, *Cattlemen Care About Beef Safety* (12 minutes, AG video 190), available from the Missouri Vocational Resource Center.

G. Conclusion

Quality assurance programs help alleviate consumer apprehension about medication usage, placements of injections, drug residues, and environmental conditions. Producers need to make a conscious effort to reevaluate procedures and practices to realign them with these program guidelines. Student awareness of these programs will reenforce the importance of quality production and give them the tools required to defend the industry against opposition or misinformation.

H. Competency

Describe animal health quality assurance programs.

I. Answers to Evaluation

1. b
2. d
3. c
4. b
5. d
6. c
7. d
8. b
9. a
10. b, d, e (question worth eight points)
11. a, d, e, f (question worth eight points)
12. a, d, e, f (question worth six points)

UNIT IV - ANIMAL HEALTH Name_____

Lesson 7: Quality Assurance Programs Date_____

EVALUATION

Circle the letter that corresponds to the best answer.

____ 1. Rx stands for what type of medication?

a. Extra label medication
b. Prescription medication
c. Unapproved FDA medication
d. Over-the-counter medication

____ 2. OTC stands for what type of medications?

a. Extra label medication
b. Prescription medication
c. Unapproved FDA medication
d. Over-the-counter medication

____ 3. Where are IM injectable medications given?

a. In the vein
b. Under the skin
c. In the muscle
d. In the abdominal cavity

____ 4. Where are SQ injectable medications given?

a. In the vein
b. Under the skin
c. In the muscle
d. In the abdominal cavity

____ 5. Where are IP injectable medications given?

a. In the vein
b. Under the skin
c. In the muscle
d. In the abdominal cavity

____ 6. The Pork Quality Assurance program has how many levels?

a. 1
b. 2
c. 3
d. 4

____ 7. How often should the "Quality Assurance Checklist" be completed by the producer and veterinarian?

a. Every three months
b. Every six months
c. Every nine months
d. Once a year

____ 8. How many critical control points are there in the Pork Quality Assurance Program?

a. 5
b. 10
c. 15
d. 20

____ 9. What should a producer do to reduce tissue and skin damage, leakage, and stress with injectable medications?

a. Use the smallest recommended needle.
b. Use the largest recommended needle.
c. Inject in the muscle.
d. Inject under the skin.

Complete the following multiple answer questions.

10. A veterinarian/client/patient relationship exists when which conditions are met?

____ a. When producer makes all decisions on health-related events of livestock
____ b. When the veterinarian has sufficient knowledge of producer's livestock
____ c. When producer stores all medications properly
____ d. When veterinarian is readily available to make a follow-up evaluation on livestock
____ e. When producer agrees to follow instructions provided by veterinarian on medical judgments on livestock
____ f. When producer agrees to follow instructions provided by a fellow producer
____ g. When the veterinarian's assistant makes a suggestion on medical treatments
____ h. When producer has sufficient knowledge on his/her livestock

11. Check the appropriate factors that are required on extra-label medications.

____ a. Name and address of prescribing veterinarian
____ b. Producer's name and address
____ c. Producer's telephone number
____ d. Active ingredient
____ e. Cautionary statements
____ f. Directions
____ g. Animal's identification number
____ h. Animal's body weight

12. Mark statements that are true of the Missouri Beef Quality Assurance Program.

____ a. Based on a code of ethics for producers
____ b. Includes 10 critical control points
____ c. Uses a checklist as a minimum for health programs
____ d. Includes injection guidelines to reduce infection risk
____ e. Emphasizes drug withdrawal times to avoid residue problems
____ f. Requires feed ingredient record keeping