W 1204

1-2 YEARS IN PROJECT

SHEEP PROJECT AREA GUIDE

BEGINNER

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Chapter 1
Know the Lingo?

Projected Outcome:

- Define the following terms: ewe, buck, ram, wether, lamb, flock, crossbred, purebred, club lamb, lambing

Key Terms:

- **Ewe:** Female sheep of any age.
- **Buck:** Intact male sheep used for breeding, same as ram.
- **Ram:** Intact male sheep used for breeding, same as buck.
- **Wether:** Castrated male sheep, typically harvested for meat.
- **Lamb:** Young sheep, typically less than one year of age. Also, the meat from a sheep harvested at less than one year of age.
- **Flock:** Group of sheep managed together.
- **Crossbred:** Offspring produced from breeding two or more different breeds together.
- **Purebred:** Offspring produced from breeding parents of the same breed. Often the resulting offspring is eligible to be registered in a breed association if the parents were also registered.
- **Club Lamb:** Lamb used as a project animal for youth, typically in 4-H and/or FFA programs. Often these are short-term, terminal projects for youth.
- **Lambing:** Parturition or giving birth in sheep.

Fill in the blank and identify the pictures below with terms from the word bank.

Word Bank

Buck	Club Lamb	Crossbred	Ewe	Ram
Flock	Lamb	Lambing	Purebred	Wether

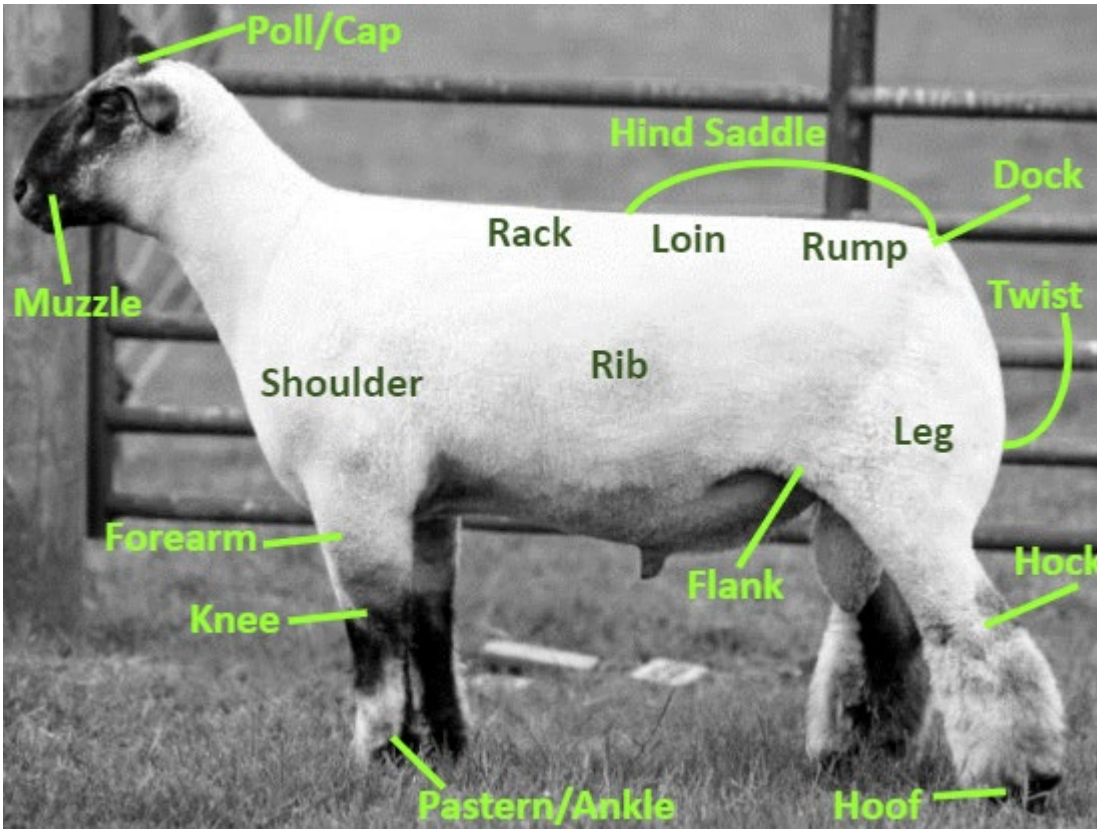
1. Parturition is a term for giving birth. Parturition in sheep is known as _____.
2. A castrated male sheep is known as a _____, which is harvested for meat.
3. _____ is a group of sheep typically managed together on the same farm.
4. When two sheep of the same breed are bred together, their offspring is known as _____. This animal is often eligible to be registered with breed association.
5. A 6-month-old female sheep is known as a _____.
6. A _____ is a sheep that is selected by 4-H/FFA members as a project animal in which they use to learn about sheep production as a short-term, terminal project.
7. In sheep production, there are two terms for a male intact sheep that is used for breeding. Those two terms are _____ and _____.
8. A _____ is a general term for the offspring of the breeding of a Hampshire ram and a Southdown ewe.
9. The term _____ has two meanings. It refers to sheep and the meat from sheep that are less than one year of age.

Chapter 2
Parts of the Animal

Projected Outcome:

- Label the following parts and regions of the body: muzzle, poll or cap, forearm, knee, pastern/ankle, shoulder, rib, rack, loin, rump, hind saddle, dock, leg, flank, twist, hock, hoof

Knowing the parts of a sheep is one of the most basic areas to learn. This is important to become a knowledgeable sheep producer, judge, veterinarian, sales representative and or other workers within the sheep industry. The picture below shows the major parts of the sheep. It is critical to memorize this figure in order to become successful in the sheep industry.

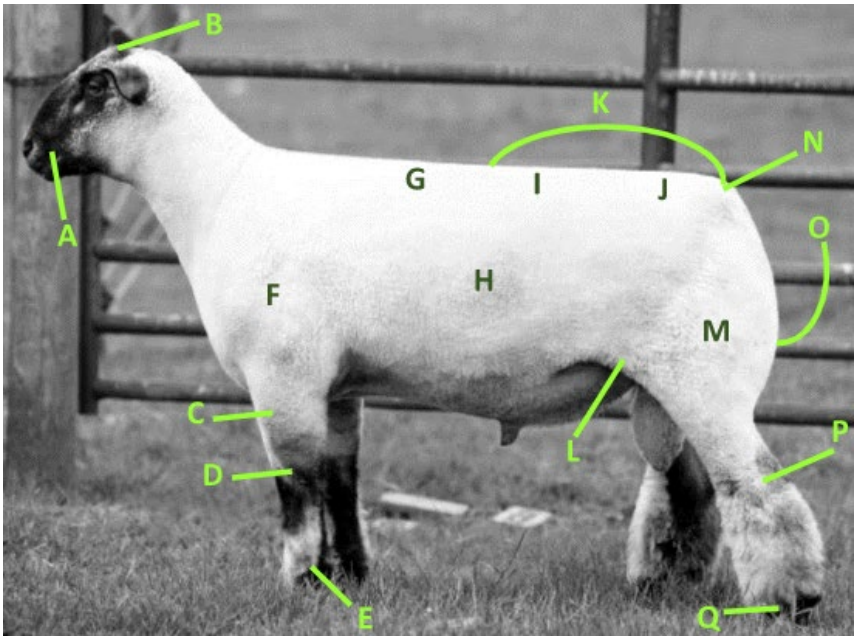


Label each animal part in the picture below using terms from the word bank.

Word Bank

Dock	Flank	Forearm	Hind Saddle	Hock
Hoof	Knee	Leg	Loin	Muzzle
Pastern/Ankle	Poll/Cap	Rack	Rib	Rump
Twist				

A.	G.	M.
B.	H.	N.
C.	I.	O.
D.	J.	P.
E.	K.	Q.
F.	L.	



Chapter 3
Health and Welfare

Projected Outcomes:

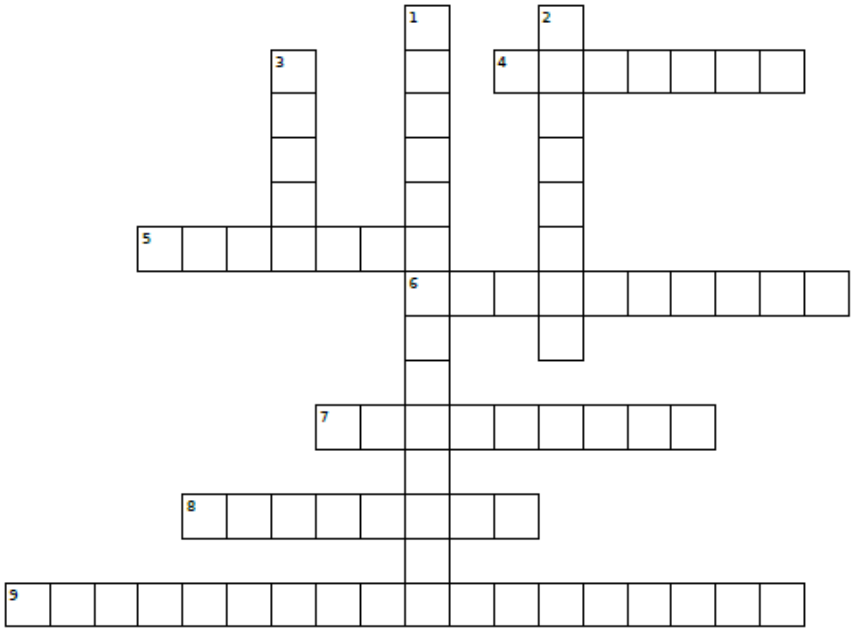
- Define the following terms: vaccine, booster, antibiotic, bacteria, virus, colostrum, parasite, withdrawal time, dewormer resistance
- Distinguish between different types of injections: subcutaneous, intramuscular, intravenous
- Locate the proper injection sites on the animal
- Describe normal vs. sick behaviors in sheep
- Describe the following diseases in sheep: scrapie, ringworm, sore mouth, foot rot, internal and external parasites
- Identify the major parts of a medicine label

Key Terms:

- **Vaccine:** substance used to stimulate the body's immune system against a specific disease.
- **Booster:** additional vaccine given after a set amount of time meant to enhance the body's immune response to a specific disease.
- **Antibiotic:** substance that kills or slows the growth of bacteria.
- **Bacteria:** single celled microorganisms that cause disease in animals.
- **Virus:** ultra-microscopic, infectious microbe that replicates in a host and causes disease.
- **Colostrum:** first milk produced by the ewe that is high in antibodies that protect lambs from disease early in their life.
- **Parasite:** organism that lives in or on a host and gets its food at the expense of the host animal; can be internal and external.
- **Withdrawal Time:** amount of time that must pass after the use of a medication before an animal or any of its products (meat or milk) can be marketed.
- **Dewormer Resistance:** when a dewormer loses some or all of its effectiveness because the worms remaining are no longer susceptible to that particular dewormer.

Activity: Crossword Puzzle

Health and Welfare Terms



Down:

1. amount of time that must pass after the use of a medication before an animal or any of its products (meat or milk) can be marketed
2. single celled microorganisms that cause disease in animals
3. ultra-microscopic, infectious microbe that replicates in a host and causes disease

Across:

4. substance used to stimulate the body's immune system against a specific disease
5. additional vaccine given after a set amount of time meant to enhance the body's immune response to a specific disease
6. substance that kills or slows the growth of bacteria
7. first milk produced by the ewe that is high in antibodies that protect lambs from disease early in their life
8. organism that lives in or on a host and gets its food at the expense of the host animal; can be internal and external
9. when a dewormer loses some or all of its effectiveness because the worms remaining are no longer susceptible to that dewormer

Answer Key:

Down:
1. Withdrawal Time
2. Virus
3. Bacteria

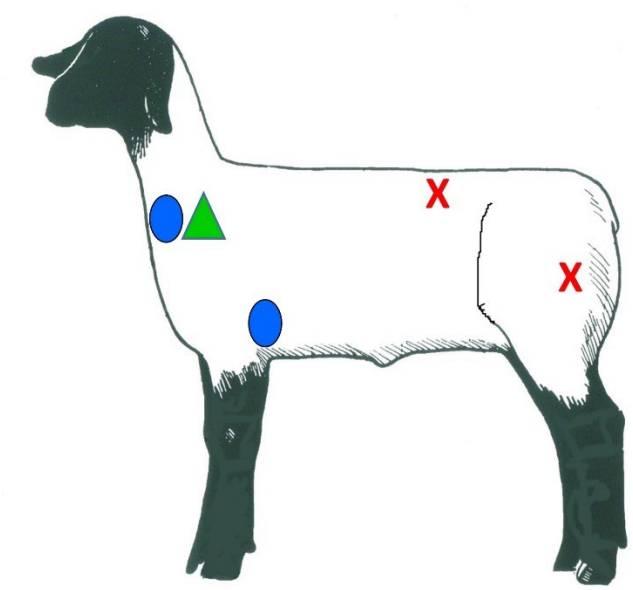
Across:
4. Vaccine
5. Booster
6. Antibiotic
7. Colostrum
8. Parasite
9. Dewormer Resistance

Medications are typically given to sheep pre-mixed in the feed, orally as a bolus or liquid via the mouth and using a needle to give an injection through the skin. There are three main types of injections:

1. Subcutaneous (SQ): injection given just under the skin.
2. Intramuscular (IM): injection given directly into the muscle.
3. Intravenous (IV): injection given directly into the vein.
    a. IV injections are typically reserved for veterinarians.

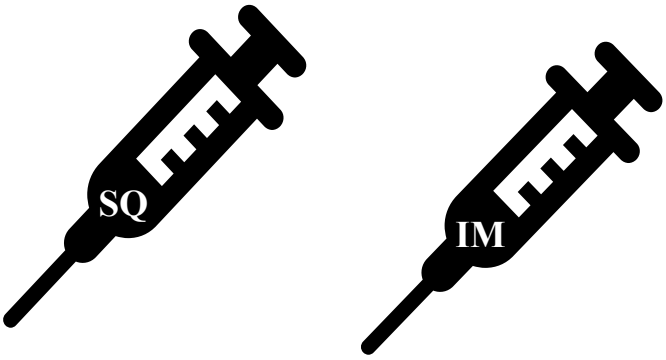
It is crucial to understand where each type of injection should be given on the body of sheep. Giving medications in the wrong place on the animal can result in tissue site damage and lead to increased risk of drug residues in meat and decreased value of the lamb carcass. Information on how to properly give each medication is listed on the product label and should be followed at all times. All injections should be given in the neck region or behind the elbow to avoid the valuable meat cuts of the loin and leg, which are marked with a red X.

- SQ = Blue oval
- IM = Green triangle



Activity: Injection Sites

- Sketch out a picture of your favorite breed of market lamb.
- Cut out the labeled syringes below and place them on your market lamb in the most appropriate place to give each type of injection.



Activity: Giving SQ and IM Injections

Materials:

- Small plastic syringe
- Small bowl of water
- Food coloring
- Hot Dog bun
- Plastic sandwich bag
- Hole puncher – make one hole on each side of the middle to lower part of the bag

- Fill up small bowl of water and add a few drops of food coloring to the water.
- Put the bun inside the sandwich bag with the holes on each side. The plastic bag represents the hide of the animal, and the bun is the muscle.
- Pull 2-cc of colored water into the syringe.
- Use the tenting procedure (see diagram) to pull the bag away from the bun and inject the 2-cc of water into the hole above the bun. You have just given a subcutaneous (SQ) injection. Notice that most of the color stain is on the outside of the bun. If the inside of the bun is deeply stained, then your SQ injection went into the muscle.

- Next, flip the bag to the other side.
- Pull 2-cc of colored water into the syringe.
- Inject the 2-cc of water through the hole directly into the bun. You have just given an intramuscular (IM) injection. Notice that most of the color stain is inside the bun. If the outside of the bun is deeply stained, then your IM injection did not go far enough into the muscle.

This activity was adapted from the Vaccinations and Injections Activity that is part of the Animals Inside & Out Program developed by University of Nebraska Extension (http://extension.unl.edu/).

Normal Versus Sick Behaviors in Sheep:

Managing disease in animals typically consists of treatment and prevention. Preventing disease is always best and typically includes biosecurity measures including but not limited to use of a vaccination program, sanitation of facilities and equipment and controlling pests that can spread disease. Treating disease is responding to a disease when it happens, which could include using antibiotics to treat infections, analgesics to relieve pain or discomfort and de-wormers for internal or external parasites.

While preventing disease before it ever happens is best, early detection of disease in sheep is very important in order to minimize the spread and severity of the disease. In order to be able to recognize when a sheep is sick, it is critical to know what normal behaviors look like. It is important to learn what normal behavior looks like relative to their eating and drinking patterns, how they walk and interact with their environment, consistency of manure, body condition and normal appearance of wool, skin and body.

The below behaviors may signal disease, and in most cases, should require a closer examination:

- Standing alone away from other sheep
- Not eating or drinking normally
- Hunched over or bent back appearance
- Diarrhea
- Breathing difficulty or faster than normal respiration
- Swelling in joints or inability to walk normally
- Cough and/or discharge
- Rough wool/hair or patches of loss

Activity: Sheep Observation

- If you have access to sheep, spend 15 minutes each morning and evening observing them to learn how they react to normal activities like feeding, pen cleaning, other sheep, etc. Keep a record of their behaviors so you can tell when their behavior is not normal and may signal something being wrong with them

- If you do not have easy access to sheep, contact your county 4-H agent for assistance in contacting a local sheep producer who would let you tour the farm to observe behaviors in the sheep and ask questions about management.

Below is a list of common diseases of sheep. This is not a comprehensive list and is not meant to be a guide to diagnosing and treating disease in sheep. It is imperative to have a working relationship with a veterinarian (VCPR or veterinarian-client-patient-relationship) delete as a resource for developing and implementing a health management plan.

- **Scrapie:** fatal, degenerative disease affecting the central nervous system of sheep and goats
- **Ringworm:** common skin infection caused by a fungus, also called club lamb fungus, can be transmitted from sheep to humans
- **Sore Mouth:** infection caused by a virus that causes scabs and sores in the mouth region, can be transmitted from sheep to humans as orf
- **Foot Rot:** bacterial infection of the foot, causes pain and can lead to lameness
- **Internal Parasites:** Internal parasites (worms) typically spread between sheep through a fecal-oral route. The life cycle includes the adult worm laying eggs that are then passed out of the sheep in manure. The eggs then hatch into larvae, which spread onto blades of grass and are consumed by other sheep as they are grazing. This starts the life cycle all over and continues the spread of the worms
- **External Parasites:** External parasites are insects that cause stress to the animal resulting in decreased production. They can also spread other diseases. Two common parasites are lice and mites

Activity: Disease Trivia

- Answer the below disease questions.
    - Which disease is caused by a fungus?
    - How do internal parasites spread from sheep to sheep?
    - Which disease displays as scabs in the mouth region and can be transmitted to humans? What is this disease called when it infects humans?
    - What does VCPR stand for?
    - Which disease is known to be fatal?
    - What is another name for ringworm?
    - Which type of parasite would a fly be classified?
    - Foot Rot is an infection of the foot. What organism causes this infection?

Now check your answers on the next page.

Answer Key:

- Which disease is caused by a fungus?
  - Ringworm
- How do internal parasites spread from sheep to sheep?
  - Fecal-oral route; sheep eating grass that contains larvae
- Which disease displays as scabs in the mouth region and can be transmitted to humans? What is this disease called when it infects humans?
  - Soremouth, orf
- What does VCPR stand for?
  - Veterinarian-Client-Patient-Relationship
- Which disease is known to be fatal?
  - Scrapie
- What is another name for ringworm?
  - Club lamb fungus
- Which type of parasite would a fly be classified?
  - External parasite
- Foot Rot is an infection of the foot. What organism causes this infection?
  - Bacteria

The medicine label provides all the details needed to properly administer medications to sheep. It is imperative to read, understand and follow all the instructions on the medicine label. Any use of a particular medicine that goes against the label is called an extra-label drug use and is illegal. It is also more likely to result in drug residues in the meat or milk of the animal. The medicine label includes the following important items:

- **Trade Name:** the name under which the medicine is sold (i.e. Aureomycin).
- **Active Ingredient:** the ingredient that is responsible for the effect on the animal (i.e. chlortetracycline).
- **Concentration:** the amount of active ingredient in the solution (i.e. 100 mg/ml).
- **Route of Administration:** how the medicine can be given, for most injectable medicines this will be subcutaneous or intramuscular.
- **Species and Animal Class:** the only types of animals approved to be treated with this medicine.
- **Approved Uses:** the diseases that the medicine can be legally used to treat.
- **Dosage:** the amount and frequency that can be given.
- **Withdrawal Time:** length of time that must pass after last treatment before animal can be sold.
- **Cautions and Warnings:** notice of any possible harmful responses by the animal.
- **Sizes Available:** container sizes of the medicine that are available.
- **Storage Requirements:** how the medicine should be stored (i.e. refrigerated or room temperature).

Activity: Reading Medicine Labels

- Print the attached medicine label and section labels. Cut out the labels and identify the different major sections of the medicine label by placing the label next to the correct section on the medicine label. Use the attached medicine label key to see how you did.

VOLUNBIOTIC
(Tennecillin in Aqueous Solution)

For use in Non-Lactating Sheep and Goats
For Subcutaneous Use Only

Active Ingredient: Volunbiotic is a broad-spectrum antibiotic that contains 50 mg/ml of tennecillin hydrochloride in an aqueous base.

Indications: Non-Lactating Sheep: foot rot and pneumonia; Non-Lactating Goats: foot rot and wound infections.

Dosage and Directions for Use: Using aseptic technique, inject 2ml per 50 pounds of body weight subcutaneously. Continue treatment for 1-2 days after symptoms disappear or as directed by a veterinarian.

Cautions and Warnings:
1. Sheep and goats may not be slaughtered for human consumption within 15 days of the final treatment.
2. Volunbiotic should only be administered subcutaneously, never intramuscularly or intravenously. Injecting Volunbiotic into the muscle can cause tissue damage and lead to a drug residue in the meat.
3. Do not use in lactating sheep or goats where milk or milk products is used for human consumption.
4. Volunbiotic should be stored between 36°-46° F away from light. Shake well before use.
5. Keep out of reach of children, uninformed people and animals.
6. Wash hands thoroughly after use.
7. Quality assurance guidelines should be followed at all times.

How Supplied: Volunbiotic is available in 50ml and 100ml vials.

Trade Name	**Active Ingredient**
Concentration	**Route of Administration**
Species and Animal Class	**Approved Uses**
Dosage	**Withdrawal Time**
Cautions and Warnings	**Sizes Available**
Storage Requirements	

Answer Key:

VOLUNBIOTIC ← **Trade Name**

(Tennecillin in Aqueous Solution)

For use in Non-Lactating Sheep and Goats ← **Species and Animal**

For Subcutaneous Use Only ← **Route of Administration**

Concentration ↓

Active Ingredient: Volunbiotic is a broad-spectrum antibiotic that contains 50 mg/ml of tennecillin hydrochloride in an aqueous base.

↑ **Active Ingredient**

Approved Uses ↓

Indications: Non-Lactating Sheep: foot rot and pneumonia; Non-Lactating Goats: foot rot and wound infections.

↓ **Dosage**

Dosage and Directions for Use: Using aseptic technique, inject 2ml per 50 pounds of body weight subcutaneously. Continue treatment for 1-2 days after symptoms disappear or as directed by a veterinarian.

Cautions and Warnings ←

Cautions and Warnings:

1. Sheep and goats may not be slaughtered for human consumption within 15 days of the final treatment.

↖ **Withdrawal Time**

2. Volunbiotic should only be administered subcutaneously, never intramuscularly or intravenously. Injecting Volunbiotic into the muscle can cause tissue damage and lead to a drug residue in the meat.
3. Do not use in lactating sheep or goats where milk or milk products is used for human consumption.
4. Volunbiotic should be stored between 36°-46° F away from light. Shake well before use.

Storage

5. Keep out of reach of children, uninformed people and animals.
6. Wash hands thoroughly after use.
7. Quality assurance guidelines should be followed at all times.

How Supplied: Volunbiotic is available in 50ml and 100ml vials.

Sizes Available

- **Answer the below questions by reading the medicine label.**
    - What type of medicine is Volunbiotic classified?
    - What is the trade name for this medicine?
    - How injection method should be used to administer this medicine?
    - What location on the animal should the injection be given?
    - How many sheep can this medicine be given using the same needle?
    - What would be the dosage for a 100-pound market lamb?
    - If this medicine is given to a sheep on March 1, what date could this animal be harvested for human consumption?
    - Should this medicine be stored in the refrigerator?
    - What diseases can this medicine be used to treat in sheep?
    - What would be the dosage for a 200-pound beef calf?

Now check your answers on the next page.

Answer Key:

- What type of medicine is Volunbiotic classified?
  - Antibiotic
- What substance in this medicine is responsible for its effect on the animal?
  - Tennecillin Hydrochloride
- How injection method should be used to administer this medicine?
  - Subcutaneous (SQ)
- What location on the animal should the injection be given?
  - Neck
- How many sheep can this medicine be given using the same needle?
  - One
- What would be the dosage for a 100-pound market lamb?
  - 4ml
- If this medicine is given to a sheep on March 1, what date could this animal be harvested for human consumption?
  - March 16
- Should this medicine be stored in the refrigerator?
  - Yes
- What diseases can this medicine be used to treat in sheep?
  - Foot Rot and Pneumonia
- What would be the dosage for a 200-pound beef calf?
  - None, not approved for use in beef cattle

Chapter 4
Nutrition and Feed

Projected Outcomes:

- Define the following terms: ruminant, forage, feedstuff, concentrate, protein, energy
- Label the four parts of a ruminant stomach: reticulum, rumen, abomasum, omasum
- Identify the following forages from samples: tall fescue, orchard grass, clover, alfalfa
- Learn to determine the forage composition of a pasture

Key Terms:

- **Ruminant:** Animals that have a compartmentalized stomach in which each compartment has a distinct function for the digestion of feed. They are generally fed a forage-based diet. Farm animal examples include beef and dairy cattle, sheep and goats.
- **Forage:** Crops used as pasture or hay to feed animals. Examples include tall fescue and orchard grass.
- **Feedstuff:** Any single feed ingredient fed to sheep. Examples would include corn, soybean hulls and cottonseed meal.
- **Concentrate:** A feed ingredient that is relatively low in fiber and has at least 70% Total Digestible Nutrients (TDN). Corn is a common example of a concentrate.
- **Protein:** Protein is a major part of most body tissues and is involved in digestion, growth promotion and immune response. Although it is made up of amino acids, sheep rations are typically formulated for protein instead of specific amino acids. This is due to the ability of the rumen micro-organisms to create microbial protein that is used by the animal. Protein is commonly referred to as Crude Protein (CP) on most feed labels.
- **Energy:** Energy is used by the animal to perform various functions including growth, respiration and maintain body temperature. Sheep primarily get energy through the intake of carbohydrates and fats, with fats having 2.25 times more energy than carbohydrates. Energy is commonly reported as Total Digestible Nutrients (TDN) on most feed labels.

Rumen Compartments:

The four compartments of the ruminant digestive system are listed below along with their major digestive functions.

1. Rumen: Commonly called a large fermentation vat. The rumen is the host for many micro-organisms (bacteria and protozoa), which are responsible for the fermentation that breaks down the cell wall content of ingested feed.

2. Reticulum: Commonly called the honeycomb because of the honeycomb appearance of the walls of the reticulum. The reticulum sits on the front side of the rumen and is the place where non-food items typically end up after being ingested.

3. Omasum: Commonly called manyplies. This is because it has many folds that can also look like the pages in a book. The major function of the omasum is water absorption from feed that the animal has consumed.

4. Abomasum: Commonly called the true stomach. It is the compartment that functions much like the gastric stomach of a non-ruminant.

Forages:
Forages are the basis for economic sheep production in Tennessee. Because of their ruminant digestive system, sheep are able to utilize forages from land that is not well suited for crop production. Through improved forage and grazing management, forages can provide the majority of the nutrient needs for most segments of sheep production. Growing season will differ depending on the species of forage, but forages are generally classified as cool-season or warm-season. Cool-Season forages generally have a longer growing season during cool/cold weather from approximately from September to April. warm-season forages generally grow during warmer weather of approximately April to October. A perennial forage is one that does not need to be reseeded every year. They generally persist for many years if managed appropriately. Annual forages are those that must be reseeded every year.

Regardless of forage type, below are three general recommendations for improving forage quality for pasture and hayfields.

1. Fertilize according to soil test
    - Depending on the forage type, fertilization of nitrogen, phosphorus and potassium is generally needed for optimal forage growth. It is important to only supply what the plant needs to ensure that the nutrients are used. Soil testing will provide the level of nutrients already in the soil so that only needed fertilizer can be applied.
2. Control weeds
    - Weeds will compete with forages for sunlight, nutrients and water. Thus, they can decrease the quality of the forage as well as decrease the persistence of the stand. Control of weeds typically includes periodic clipping of forages and the appropriate use of herbicides.
3. Add clover
    - The addition of white and red clovers will increase the quality of the forage whether it is pasture or hay. This will result in higher animal performance. Generally, clovers will need to be over-seeded approximately every three years.

Below are four common forages that are important to Tennessee sheep producers.

- Tall Fescue: The most common cool-season forage grass in Tennessee that is used for pasture and hay. If infected with endophyte fungus (majority is infected in Tennessee), is very resistant to grazing pressure, drought and pests. If not infected, should not be grazed less than 3 inches.

  Source: Illinois Extension

- Orchardgrass: A cool-season forage used for pasture and hay. It is a high-quality forage under good management conditions but is less resistant to grazing pressure and drought than endophyte-infected tall fescue.

  Source: Missouri Department of Conservation

- White Clover: Primarily used as a pasture forage, often over-seeded into existing grass pastures (frequently tall fescue and orchardgrass). Fairly resistant to heavy grazing pressure. Requires adequate phosphorus and potassium fertilizer.

  Source: Cornell University

- Alfalfa: High quality forage that is primarily used for hay and haylage. Requires higher management than most forages. Due to high cost and demand, limited use in sheep production.

  Source: Jamback Farms

Activity: What's in My Pasture?

Supplies:

- Four 9-inch, flexible end drinking straws
- Access to a pasture or yard (basically any grassy area)

Instructions:

1. Pull the flexible end of each straw to make them as long as possible and then bend at the flexible part of each straw.
2. Insert the long side into the short side of second straw.
3. Continue until you have a square (see picture below).

4. Place the forage square in a random location in the pasture/yard. Tossing the forage square a short distance in front of you allows for random sampling.
5. Looking from above the forage square, determine the forage species composition. Estimate the following to the nearest 5% and record:
    a. Presence of desirable forage (not counting clover)
    b. Presence of clover
    c. Presence of weeds (undesirable forage)
    d. Presence of bare ground
6. Repeat steps 4 and 5 four more times. Fill in Table 1 with your observations.
7. Average the values in each column.

Table 1. Forage Observations

Sample #	% Grass	% Clover	% Bare Ground
1			
2			
3			
4			
5			
Average			

This activity was adapted from the Species Composition and Forage Mass activity developed by Assistant Professor Katie Mason, UT Animal Science.

Chapter 5
Feeding and Forages

Projected Outcomes:

- Identify the following feedstuffs from samples: corn, corn gluten feed, whole soybeans, soybean meal, soybean hulls, whole cottonseed, cottonseed meal, cottonseed hulls, white salt, trace-mineralized salt
- Simulate the rumen of sheep and visualize how fermentation works to break down plants to provide nutrients to the animal

Forages are definitely the basis of sheep production in Tennessee. Whether it is through grazing or feeding hay, forages make up the majority of most sheep diets. There are times depending on the situation and production cycle where feedstuffs play an important role in sheep nutrition. Feedstuffs are generally classified as an energy concentrate, protein supplement, roughage and mineral. Feedstuffs are considered energy concentrates at when they possess a minimum of 70% total digestible nutrients and are considered protein supplements when they possess a minimum of 20% crude protein.

One of the most important factors to understand when comparing feedstuffs and complete feeds for nutrient composition and price is the difference between Dry Matter (DM) basis and As-Fed (AF) basis. Basically, the difference between the two is the presence of water. Feedstuffs reported on an AF basis contain water while feedstuffs reported on a DM basis do not contain water. Since water content can cause nutrient levels to vary greatly between feedstuffs, it is important to work with feedstuffs on a DM basis. This ensures that equal comparisons are made relative to the nutrient levels in each feedstuff.

An easy way to remember the difference is that the percent value for a specific nutrient will be larger on a DM basis because once the water is removed, that specific nutrient will be a larger percentage of the total.

Below are common feedstuffs fed to sheep along with their typical nutrient profiles on a DM basis.

Whole Shelled Corn

- Popular grain crop gown for multiple industries
- Commonly processed into cracked corn and ground corn
- Energy concentrate

Dry Matter	86%
Crude Protein	8.7%
Total Digestible Nutrients	93%
Crude Fiber	2.2%
Calcium	0.01%
Phosphorus	0.03%

Corn Gluten Feed

- By-product of corn milling industry
- Protein supplement
- Also high in energy

Dry Matter	88%
Crude Protein	23.9%
Total Digestible Nutrients	85.2%
Crude Fiber	11.4%
Calcium	0.23%
Phosphorus	1.02%

Whole Soybeans

- Popular crop grown for multiple industries
- Protein supplement
- Also high in energy

Dry Matter	90%
Crude Protein	42.2%
Total Digestible Nutrients	94.4%
Crude Fiber	5.6%
Calcium	0.28%
Phosphorus	0.66%

Soybean Meal

- By-product of oil extraction from soybeans
- Protein supplement
- Also high in energy

Dry Matter	88%
Crude Protein	54.5%
Total Digestible Nutrients	89.8%
Crude Fiber	3.4%
Calcium	0.35%
Phosphorus	0.82%

Soybean Hulls

- By-product of soybean processing
- Energy concentrate

Dry Matter	91%
Crude Protein	12.1%
Total Digestible Nutrients	71.4%
Crude Fiber	40.1%
Calcium	0.69%
Phosphorus	0.21%

Whole Cottonseed

- Fiber crop
- Protein supplement
- Also high in energy and fiber

Dry Matter	92%
Crude Protein	25.0%
Total Digestible Nutrients	98.9%
Crude Fiber	28.3%
Calcium	0.21%
Phosphorus	0.66%

Cottonseed Meal

- By-product of cotton ginning
- Protein supplement
- Also high in energy

Dry Matter	91%
Crude Protein	45.1%
Total Digestible Nutrients	78.0%
Crude Fiber	13.8%
Calcium	0.21%
Phosphorus	1.16%

Cottonseed Hulls

- By-product of cotton dehulling process
- Roughage/Fiber source

Dry Matter	90%
Crude Protein	4.4%
Total Digestible Nutrients	52.2%
Crude Fiber	47.8%
Calcium	0.15%
Phosphorus	0.09%

White Salt

- Mineral supplement
- Source of sodium and chloride

Trace Mineralized Salt

- Mineral supplement
- Provides low level of micro-minerals

Activity: Feed Rations for Sheep

Supplies:

- 1 and 1/4 cups of jellybeans
- 3/4 cup of chocolate chips
- 9 cups of flaked coconut
- 2 tablespoons of raisins
- 2 plastic sandwich bags
- Measuring Utensils (if all of these are not available, estimate using those on hand)
    - 1 cup
    - 1/2 cup
    - 1/3 cup
    - 1/4 cup
    - Tablespoon

Instructions:

1. Make each ration using the amounts listed below. Write feedlot or mid-gestation ewe on the respective bag using a pen or magic marker.
2. Mix each ration up completely by shaking the bag.
3. Inspect each ration and write down 3 differences that you see between the 2 rations.

Ration 1 – Typical Feedlot Feed Mixture

- Energy = 60% = 1 cup of jellybeans
    - Examples: corn and soybean meal
- Protein = 24% = 1/2 cup and 1 tablespoon of chocolate chips
    - Examples: soybean meal, cottonseed meal and corn gluten feed
- Fiber = 14% = 1 and 1/3 cups of flaked coconut
    - Examples: forages (grazing and hay), soybean hulls and cottonseed hulls
- Minerals = 2% = 1 tablespoon of raisins

Ration 2 – Typical Mid-Gestation Ewe Feed Mixture

- Energy = 10% = 1/4 cup of jellybeans
    - Examples: corn and soybean meal
- Protein = 10% = 1/4 cup of chocolate chips
    - Examples: soybean meal, cottonseed meal and corn gluten feed
- Fiber = 78% = 7 and 1/2 cups of flaked coconut
    - Examples: forages (grazing and hay), soybean hulls and cottonseed hulls
- Minerals = 2% = 1 tablespoon of raisins

Important Points about the Feed Mixtures

- These mixtures are meant to represent what each different type of feed sheep would eat on a daily basis. They are not representative of a feed ration that you might purchase. The percentages used to make these feed mixtures are averages of typical levels used in feeding sheep without taking into account many factors like forage quality, feed availability and cost.

- The feed mixture for the mid-gestation ewe includes the forages that the ewe would consume. This is most commonly from grazing fresh forages and hay. The forages would be fed separately from any energy and protein supplements.

- Most sheep are fed a mineral mixture that is separate from other feeds. Minerals make up a small percentage of the total diet of the animal. It is important to remember that typical cattle mineral mixtures can be deadly to sheep, primarily due to high concentrations of copper.

- Feeds provide most all nutrients in some level. Corn is the common energy supplement, but it also provides a small amount of protein. Forages are the common source of fiber/roughage for most sheep, but good quality forage can also be a great source of protein and energy.

Activity: Making a Rumen

Supplies:

- Empty app. 20-oz water/soft drink bottle with cap
- 8 packets or 3 tablespoons of white granulated sugar
- Packet of active dry yeast or dry quick rise yeast
- 9-inch latex balloon

Instructions:

- Add yeast and sugar to the bottle.
- Fill the bottle half full of warm tap water that is very warm to the touch.
- Replace cap and shake the bottle to mix the yeast and sugar.
- Place a balloon over the open top of the bottle and observe what happens.
    - It will take a few minutes for the yeast to start eating the sugar.
- Review the parts of the "mock" rumen and what they represent.
    - Water bottle = Rumen
    - Sugar = Plants that the animals eat
    - Yeast = Micro-organisms or "bugs"
    - Gas in balloon = Methane and carbon dioxide produced by rumen fermentation

This activity was adapted from the 2009 National Youth Science Day Experiment, Biofuel Blast.

Chapter 6
Reproduction

Projected Outcome:

- Define the following terms: estrus, estrous cycle, gestation, parturition, lambing percentage, seasonal breeding behavior
- Distinguish between male and female reproductive tracts

Key Terms:

Ewe: A female sheep.

Ram: An intact male sheep.

Estrus: also called standing heat; It is the period when females are ready to breed or are receptive to the male. Ewes will often seek the male out when they are in heat.

Estrous Cycle: The period in which hormones change to prepare the brain and body for follicular growth, ovulation, and maintenance of a pregnancy.

Gestation: This is the word for pregnancy in animals.

Parturition: The act of giving birth.

Lambing Percentage: $\frac{number\ of\ lambs\ weaned\ in\ a\ season}{number\ of\ ewes\ bred} \times 100$

Seasonal Breeding Behavior: These are animals that have estrous cycle activity based on season and day length, **MOST** sheep are short day breeders. This means they will be bred during the cooler months where there is less daylight.

Melatonin: This is the hormone that is in control of the reproductive system. Its amount in the animal's body increases as daylight decreases.

Short-day breeders: This is when the animal begins to cycle as day length decreases and is a term often used to describe sheep as well as other species.

Vaccine: a substance (usually injection) given to help develop immunity against a certain disease.

Pregnancy toxemia: a dangerous situation where the ewe cannot consume enough energy to meet her nutritional needs and those of her unborn lambs, requires intervention and early treatment.

Colostrum: The first milk from the ewe that is full of antibodies, energy and is crucial for the newborn lamb.

Gestation is the time period between when a **ewe**, or female sheep, becomes pregnant and when it gives birth. The health of the ewe during gestation is extremely important in order to keep the lamb and ewe healthy throughout the pregnancy. Ewes reach sexual maturity and can be bred at around 7-8 months of age depending on the breed. When making breeding decisions it is important that you select a **ram** for your ewes that has qualities that help prevent **dystocia,** or difficult birth. For example, you do not want to breed a very large, heavily muscled ram to your small-framed ewes. Sheep are pregnant for approximately 5 months (148 days), and they are normally pregnant once a year, though this can vary with certain breeds. Sheep can have anywhere from one to three lambs at a time, and some breeds can even have more than three lambs.

In order to keep the ewe healthy, it is important to feed her a healthy, balanced diet with adequate protein and energy to support the lamb. The ewe and the lamb are put at risk if you over or under feed during the pregnancy. Over feeding can lead to health issues for the mother and a big lamb that could cause dystocia. In addition to growing the lamb in-utero, the ewe is responsible for producing milk to feed the lamb once it is born. The lamb grows the most during the last month of pregnancy so you should provide extra energy during this time to supplement the ewe. If the ewe does not receive enough nutrients, she is at risk for developing pregnancy toxemia.

Pregnancy toxemia, or pregnancy disease, is a dangerous situation where the ewe cannot consume enough energy to meet her nutritional needs as well as those of her unborn lambs. This can affect overweight and underweight ewes, as well as ewes who are carrying multiple lambs. Carefully monitor nutrition to prevent this! Before the lamb is born ewes should receive a CDT **vaccine** to prevent her from getting *Clostridium perfringens type C & D* and tetanus. Vaccinating the pregnant ewe one month before she lambs also provides some immunity to her lambs once they are born.

When the lamb is fully developed and ready to be born, it sends a signal to the ewe to say "I'm ready to come out!" The process is not as simple as that, but basically the lamb tells the

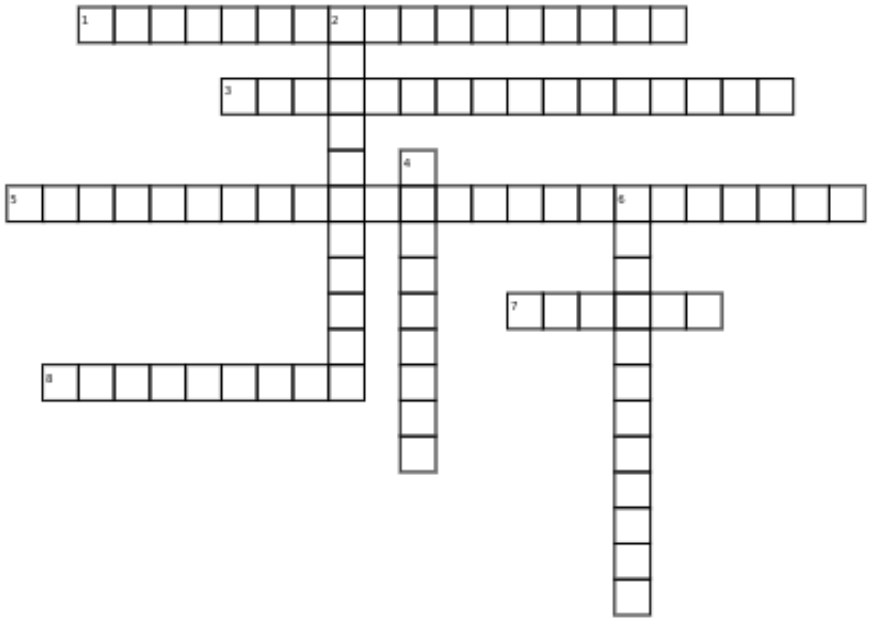
ewe when it is ready to get out of the small space of the ewe's uterus. The process of giving birth is known as **parturition**. This is explained in detail in subsequent chapters of this project area guide. When the lamb is born the ewe will lick it to clean it off and warm it up. Next the lamb will try to nurse and get milk from the ewe. The first milk from the ewe is called **colostrum** and this is the most important milk which the lamb depends on to survive. Lambs can weigh between 5 to 12 pounds when they are first born, and some can weigh more than that. The lamb should receive colostrum within 12 hours after birth, but sooner is always better. It is essential that lambs receive 10% of their body weight in colostrum, to get adequate nutrition and help develop their immune systems. Without colostrum, a lamb is at risk for starvation, and it will not have adequate antibodies to develop immunity. This means that the lamb can get sick easily and will not be able to fight off infections.

Livestock reproduction is an important process that requires proper management to ensure a successful breeding season. This process can be affected by many factors like nutrition, health, season, age, and sex. All of these processes work together in order for reproduction to occur. If health is not optimal then reproduction may not happen. The same goes for nutrition. For example, if you have skinny animals they are not worried about reproducing but are only concerned with where they will get enough nutrients to survive and continue to live. As a current or future producer of sheep, you need to understand the basics of reproduction and how it can affect your flock. This includes knowing the difference between the roles of males and females in sheep reproduction, how to feed an animal based on its stage of life, and other important aspects of general animal management.

Ewes go through an estrous cycle during certain times of the year, depending on the breed. The **estrous cycle** prepares the ewe's brain and body to be bred and maintain a pregnancy. Once the ewe is in standing heat and ready to breed, that means she is in **estrus**. Estrus happens when there is an increase in **melatonin** and a decrease in daylight, which would be during the autumn or fall season. Since most sheep breeds prefer to breed during the months with less daylight each day, their **seasonal breeding behavior** classifies them as **short-day breeders**. Once the ewe is pregnant, she goes through 148-150 days of **gestation**, which is the word for pregnancy. At the end of gestation, the ewe will give birth which is called **parturition**. There are three steps of parturition that the ewe goes through to give birth to the lamb. These steps are contractions and cervical dilation, the birth of the lamb, and release of membranes. Once all your ewes have given birth and the lambs are weaned, you can calculate your **lambing percentage**. The lambing percentage describes how successful your breeding season was and if you weaned a high or low number of lambs. To find the lambing percentage you will divide the number of lambs weaned in a season by the number of ewes bred and multiply this number by one hundred. Knowing the lambing percentage allows you to make management decisions to improve the number of lambs weaned. Different breeds can expect different lambing percentages with some being 150% and some going as high as 250%.

Crossword Activity

Crossword Puzzle



Down:

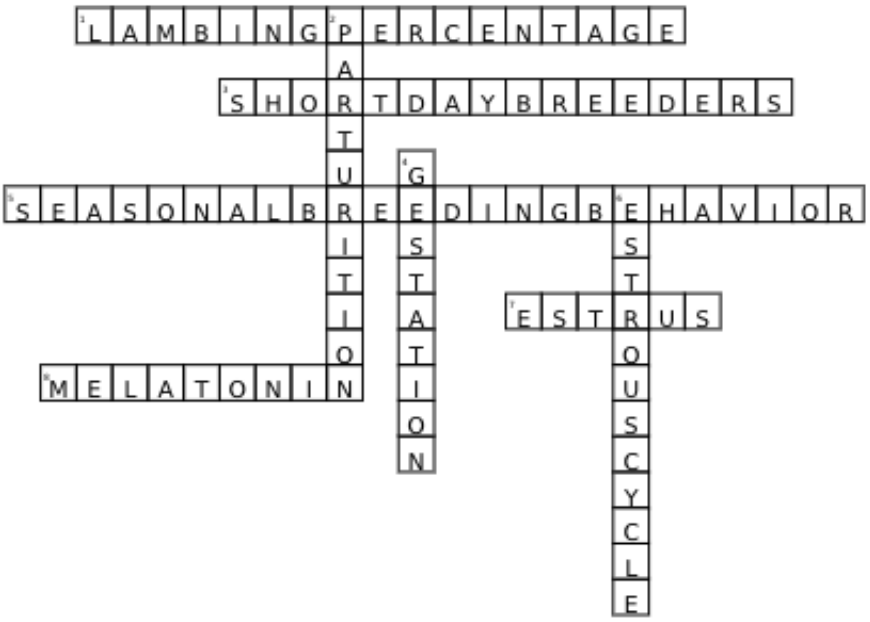
2. The act of giving birth.
4. This is the word for pregnancy in animals.
6. The period in which hormones change to prepare the brain and body for follicular growth, ovulation, and maintenance of a pregnancy.

Across:

1. (number of lambs weaned in a season/number of ewes bred) x 100
3. This is when the animal begins to cycle as the day length decreases.
5. These are animals that have cyclic activity based on season and day length, MOST sheep are short day breeders. This means they will be bred during the colder months where there is less daylight.
7. This is also called standing heat. It is the period of time when females are ready to breed.
8. This is the hormone that is in control of the reproductive system. Its amount in the animal's body increases as daylight decreases.

Answer Key

Crossword Puzzle



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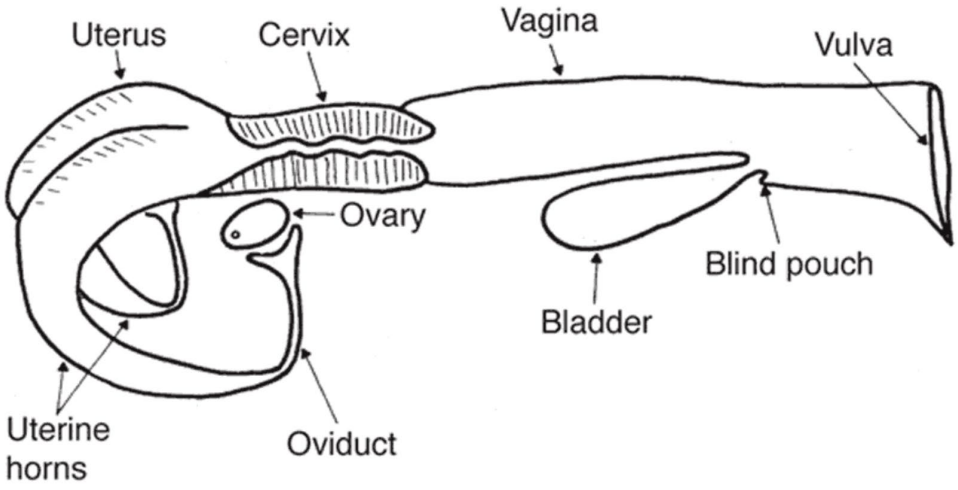
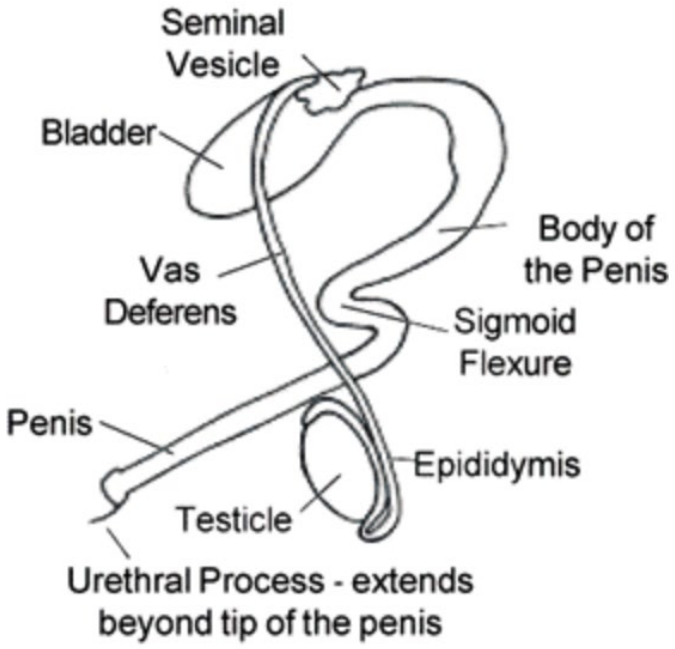
Know the Difference Between Male and Female Reproduction

Female Reproductive Tract



https://extension.missouri.edu/publications/g2015

Male Reproductive Tract

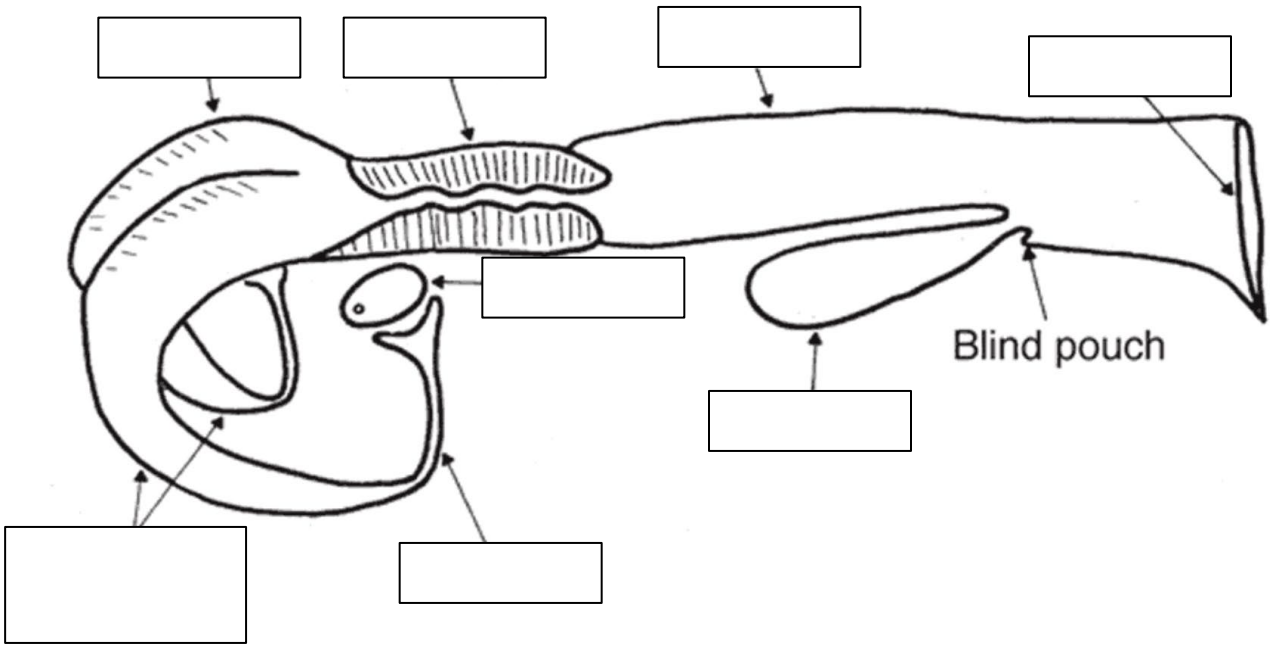


htttp://infovets.com/books/smrm/B/B710.htm

Activity: Label the Reproductive Tract Diagram

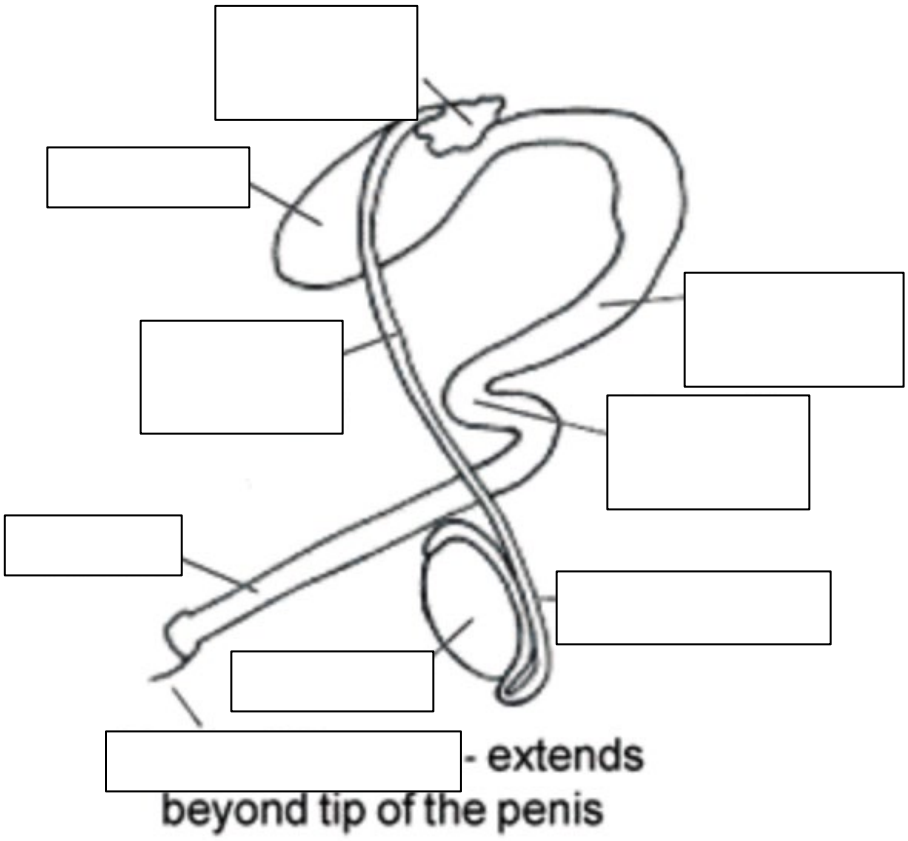
1. You will need scissors and a glue stick.
2. Cut out the terms underneath the diagram.
3. Match the terms to their structure on the diagram.
4. Glue the terms you cut out onto the squares that point to the right structure.

Female



Uterus	**Cervix**	**Vagina**	**Vulva**
Uterine Horns	**Oviduct**	**Ovary**	**Bladder**

Male



Seminal Vesicle **Bladder** **Vas Deferens** **Penis**

Testicle **Urethral Process** **Epididymis** **Sigmoid Flexure**

Body of the Penis

Activity: Parturition

The average length of gestation/pregnancy is 148 days for sheep. At the end of gestation, there are three distinct stages of parturition/birth that the female experiences so they can lamb. First, the ewe has to prepare for birth with uterine contractions, and the cervix will dilate so it is large enough for the lamb to pass through. Then the lamb will be expelled or birthed from the ewe. Finally, any leftover membranes (placenta) will be expelled from the ewe.

Supplies needed:

Regular Sized Balloon - Uterus
Ping Pong Ball - Lamb
Small Confetti - Membranes and fluids

Instructions:

1. Insert confetti into the balloon.
2. Insert ping pong ball into balloon.
3. Inflate the balloon (do not tie).
4. Locate the ping pong ball in the neck of balloon.
5. Apply pressure to the top of balloon to simulate contractions.
6. Repeat until ping pong ball is expelled from balloon:
    - The confetti should fall out of the balloon after the ball. However, if all of the confetti does not come out on its own, manually remove the confetti.

Parturition: Balloon with Ping-Pong ball inside

- 3 Stages of Parturition

1. *Cervical dilation*

- Position the ping pong ball in the "birth canal"- (opening/neck of the balloon)
- Squeezing the balloon stimulates dilation of the cervix

2. *Expulsion of fetus*

- Pushing the ball out of the balloon
- Dystocia can be presented by putting an object in front of the balloon opening to make the expulsion more difficult.

3. *Expulsion of membranes and fluids*

- Confetti represents the fluid and membranes that are passed after parturition. *If all of the confetti does not automatically fall out after the ball, manually remove the confetti to prevent retained placenta.

Activity: Fruit and Fetus Development

Overview: Each child will collect four or five different sized fruits and put in order of what stage of development a lamb is in based on size of the fruit. This will demonstrate how a fetus is growing throughout gestation and getting larger.

Directions:

1) You will need different sized fruit such as a blueberry, apple, mango, pineapple, and watermelon.
2) Then, organize the fruits based on size from smallest to largest.
3) Finally, label each fruit as month 1-5 of each month of gestation.
4) Once complete, the fruit labeled "month 1" will be the smallest and "month 5" will be the largest.

Activity: Create your own lambing box

Overview: Each student will have the opportunity to construct their own lambing box models, using shoes boxes, popsicle sticks, etc. This will help demonstrate the needs and area requirements for a pregnant ewe preparing for labor and post-partum.

Directions:

1) Each child will need a box (such as a shoe box), popsicle sticks, something to represent bedding (such as shredded paper), and something to represent a heat lamp.

2) Make a lambing pen with the popsicle sticks inside of the box.

3) Inside of the lambing pen, add plenty of "bedding" and add the heat lamp.

4) Children also have the option of adding feeders and water buckets onto their lambing pen OR making multiple lambing pens!

Chapter 7
Breeds and Genetics

Projected Outcome:

- Identify and explain the purpose for the following breeds: Dorset, Hampshire, Montadale, Oxford, Rambouillet, Shropshire, Southdown, Suffolk
- Define the following terms: sire, dam, genetic selection, pedigree
- Understand and be able to use the following performance measures: birth type, rearing type, adjusted 60-day weight, adjusted 120-day weight, average daily gain
- Understand scrapie genetic testing designations (QQ, QR, RR)

Sheep are generally classified in different ways depending on their intended purpose. The first classification is based on them having wool or hair. The important difference is that wool breeds are considered dual purpose because they produce two consumer products, meat and wool. Because of the relative expense and effort that it takes to shear sheep, some people consider hair breeds to be a positive. They can be considered lower maintenance because they do not have to be shorn regularly.

Sheep can also be classified by the primary product that they produce (meat or wool). While meat breeds still produce wool, the main product they are known for is meat. Their wool is typically of lower quality. Hampshire is an example of a meat breed. Wool breeds are most known for producing high quality wool. Wool breeds can be further classified based on the type and quality of their wool. Generally, this would be fine wool, medium wool and long wool. Fine wool breeds like Merino and Rambouillet are considered to produce the highest quality wool.

Below is a listing of some common sheep breeds:

Dorset is a white-faced breed from England that can be horned or polled (born without horns). The horned versions are called Horned Dorset. Dorset has wool and is considered a meat breed. It is medium framed and is known for out of season breeding, meaning it has a longer breeding season that many other breeds.

Hampshire is a black-faced breed from England that has wool. It is known as a large frame meat breed with black points and has wool on the cap and below the hock and knee.

Montadale is a white-faced wool breed of sheep that was developed in the US by crossbreeding Columbia and Cheviot. It is medium framed with no wool on cap or legs and also has black hooves and nostrils.

Oxford is one of the largest breeds of sheep. It is a black-faced wool breed from England. It was developed by crossbreeding Hampshire and Cotswold. It is known for having a high lambing rate. It has black points with wool on the face, cap and legs.

Rambouillet is a wool breed from France that originated from Merino sheep from Spain. It is a large frame sheep known for having very fine wool fibers that create a very high-quality fleece.

Shropshire is a black-faced wool breed from England. It has a medium frame and is one of the heaviest wool producers. It has black points with wool on the cap and down the legs.

Southdown is a small-framed meat breed from England that has wool. It has a white face, is polled and has wool on the legs.

Suffolk is a black-faced breed from England that has wool. It is known as a large-framed meat breed and has black points with no wool on the cap or on the legs.

This next activity will encourage you to find pictures on the internet of each breed. Using the Oklahoma State Breeds page, find each breed of sheep listed on the next two pages: https://breeds.okstate.edu/sheep/.

If you have a printer, feel free to print out pictures of each breed and paste them below next to the description of each one.

Now that you know what the different breeds of sheep look like, search Google Images for other pictures. Compare the pictures you saw from Oklahoma State with ones from Google Images. Then write down if you notice any differences or cut a picture out and paste it next to the description below.

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Sheep Breeds Word Search

Find the words below in the Word Bank somewhere in the word search.

M	E	X	E	Z	R	D	W	Z	C	J	M	D	U	O
S	X	C	V	J	G	B	V	U	Z	I	K	O	N	X
H	S	A	W	V	H	A	M	P	S	H	I	R	E	F
R	U	P	W	E	S	P	J	B	R	I	I	I	M	O
O	F	F	K	S	D	H	D	Z	A	L	O	V	X	R
P	F	M	P	O	X	Q	O	K	M	K	H	K	F	D
S	O	R	S	U	I	G	R	W	B	E	J	R	W	F
H	L	Q	B	T	Y	W	S	G	O	P	V	O	A	O
I	K	Y	I	H	E	M	E	Q	U	V	B	M	M	K
R	M	Q	G	D	I	C	T	X	I	I	U	M	A	Y
E	G	F	K	O	S	Y	R	I	L	M	I	Y	H	V
X	K	I	Q	W	V	L	N	C	L	B	W	Q	G	W
J	Z	T	R	N	R	I	J	D	E	Z	H	M	X	M
O	G	T	E	X	B	A	E	S	T	T	Q	E	B	W
U	J	U	S	M	O	N	T	A	D	A	L	E	K	K

Word Bank

Dorset

Hampshire

Montadale

Oxford

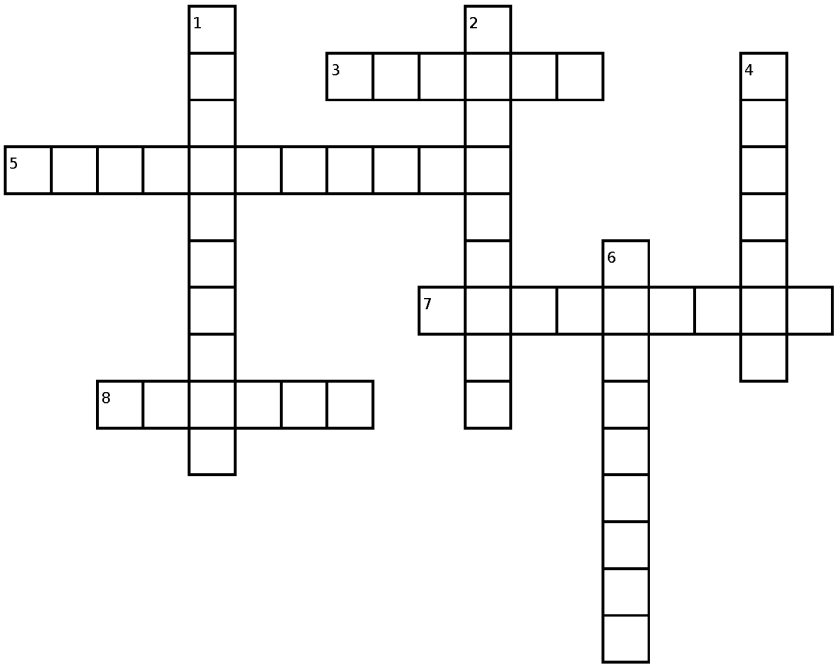
Rambouillet

Shropshire

Southdown

Suffolk

Sheep Breeds



Down:

1. black-faced wool breed from England that is medium framed and is one of the heaviest wool producers with black points with wool on the cap and down the legs
2. small-framed meat breed from England that has a white face, is polled and has wool on the legs
4. large framed black-faced breed from England that is known as a meat breed and has black points with no wool on the cap or on the legs
6. black-faced breed from England that is known as a large frame meat breed with black points and has wool on the cap and below the hock and knee

Across:

3. large framed black-faced wool breed from England that developed by crossbreeding Hampshire and Cotswold and is known for having a high lambing rate
5. large framed wool breed from France that originated from Merino sheep from Spain and is known for having very fine wool fibers that create a very high-quality fleece
7. white-faced wool breed that was developed in the US by crossbreeding Columbia and Cheviot
8. white-faced breed from England that is considered a meat breed and is known for out of season breeding

Answer Key

Down

1. Shropshire
2. Southdown
4. Suffolk
6. Hampshire

Across

3. Oxford
5. Rambouillet
7. Montadale
8. Dorset

Genetics

Key Terms:

- **Sire:** The male parent of a lamb.
- **Dam:** The female parent of a lamb.
- **Genetic Selection:** Selection of animals to breed based on the presence of certain traits or performance in one or multiple traits, often using tools like expected breeding values and genetic markers.
- **Pedigree:** Summary of the ancestors of a given animal, most often showing 3 generations (parents, grandparents and great grandparents).

Performance Measures:

- **Birth Type:** Refers to the number of lambs born in a single lambing. This will be single, twin or triplet, with twin being best. Selecting breeding stock born as twins can help increase the future chances of twinning.
- **Rearing Type:** Refers to the number of lambs raised by a dam at a time. This can affect individual lamb performance due to the increased demand placed on the dam by twins.
- **Adjusted 60-Day Weight:** Measure of weight of lambs adjusted to 60-days of age for comparison between lambs in the same flock. This is done to account for differences in weaning age, birth and rearing type, gender and age of dam.
- **Adjusted 120-Day Weight:** Measure of weight of lambs adjusted to 120-days of age for comparison between lambs in the same flock. This is done to account for differences in weaning age, birth and rearing type, gender and age of dam.
- **Average Daily Gain:** Pounds of liveweight gained per day, typically used as way to compare animal performance over a set period of time between multiple animals.

Scrapie genetic testing

Scrapie is an infectious, degenerative disease affecting the central nervous system that results in death. It is generally spread by the scrapie agent from one infected sheep to another. This could be from an infected ewe to her lambs or from infected sheep to other sheep through oral and nasal transmission.

It has been discovered that certain genes play an important role in the susceptibility of sheep to scrapie. Some sheep have certain genes that cause it to be less likely to be infected with scrapie than other sheep with different genetic make-up. There are two genes located at Codon 171 that have been found to be responsible for scrapie sensitivity, Q and R. The Q allele has been associated with increased risk of scrapie, which the R allele has been associated with increased resistance to scrapie. Since each gene has two alleles, sheep can be QQ, QR and RR.

QQ	Most likely to be infected with scrapie	Q always passed to offspring
QR	Moderate risk of scrapie infection	50:50 chance of passing Q to offspring
RR	Least likely to be infected with scrapie	R always passed to offspring

By knowing the genotype of the breeding animals that they select, a sheep producer can greatly impact the scrapie status in their flock. Selecting rams and ewes that are RR over time can greatly reduce the chances of scrapie ever infecting their sheep.

Breeding a ram and a ewe that are both QQ or both RR will result in 100% of their offspring being the same as their parents.

	Q	Q
Q	QQ	QQ
Q	QQ	QQ

	R	R
R	RR	RR
R	RR	RR

Breeding a QQ ram or an RR ram to a QR ewe will result in 50% of the offspring being QQ or RR and 50% of the offspring being QR.

	Q	Q
Q	QQ	QQ
R	QR	QR

	R	R
Q	QR	QR
R	RR	RR

Breeding an RR ram to a QQ ewe will result in 100% of the offspring being QR.

	R	R
Q	QR	QR
Q	QR	QR

Complete the performance data chart on Southdown Ewes section by answering the questions.

Word Bank

Adjusted 60-day Weight	Birth Type	Pedigree
Adjusted 120-Day Weight	Dam	Rearing Type
Average Daily Gain	Genetic Selection	Sire

Fill in the Blank:

1. The summary of the ancestors of a given animal is known as the animal's _____.

2. _____ refers to the number of lambs raised by a ewe at one time.

3. _____ is a measure of the weight of lambs adjusted to 60-days of age.

4. The selection of animals to breed based on the presence of certain traits or performance is known as _____ _____.

5. A _____ is another name for the female parent while the _____ is the male parent.

6. _____ is a measure of the weight of lambs adjusted to 120-days of age.

7. The term that refers to the number of lambs born in a single lambing is _____.

8. _____ is a term that is used to compare animal performance over a set period of time.

Questions:

1. What are the five factors that Adjusted 60- and 120-days weights are adjusted to account for?

   _____ _____

   _____ _____

   _____

2. How many generations does a normal pedigree show? _____

3. What is the most desirable birth type? _____

Performance Data – Southdown Ewes

Answer the below questions based on the performance data.

#	Birth Type	Rearing Type	Adj 60-Day WT	Adj 120-Day WT
1	Twin	Twin	52	96
2	Triplet	Twin	42	81
3	Twin	Twin	51	92
4	Single	Single	49	91

1. Which Southdown Ewe was likely the heaviest at weaning? _____
2. What is the Birth Type for the ewe that has the lowest overall performance? _____
3. Which ewe is least likely to maintain the likelihood of having twins in the flock? _____
4. Which 2 ewes are the most desirable based on Birth and Rearing Type and performance? _____ and _____

Instructions:

1. Complete the genotypes below for scrapie sensitivity using combinations of Q and R.

   _____ Most likely to be infected with scrapie

   _____ Moderate risk of scrapie infection

   _____ Least likely to be infected with scrapie

2. Complete the below breeding scenarios relative to genotype at Codon 171.

   a. You have 5 ewes that you learn are QQ and decide that you want to increase the scrapie resistance in your flock as quickly as possible. Complete the below scrapie squares to see what type of ram will work the quickest.

Breeding QR Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**
Q		
R		

Results

_____ / _____ will have genotype that is most likely to infected with scrapie

_____ / _____ will have genotype that is moderate risk of scrapie infection

_____ / _____ will have genotype that is least likely to be infected with scrapie

Breeding RR Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**

R		
R		

Results

_____ / _____ will have genotype that is most likely to infected with scrapie

_____ / _____ will have genotype that is moderate risk of scrapie infection

_____ / _____ will have genotype that is least likely to be infected with scrapie

Breeding QQ Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**
Q		
Q		

Results

_____ / _____ will have genotype that is most likely to infected with scrapie

_____ / _____ will have genotype that is moderate risk of scrapie infection

_____ / _____ will have genotype that is least likely to be infected with scrapie

3. Answer the below questions.

   a. Which ram will result in 100% of offspring continuing to be the most likely to be infected with scrapie? _____

b. Which ram will result in 50% of offspring having a moderate risk of scrapie infection? _____

c. Which ram will result in 100% of offspring having a moderative risk of scrapie infection? _____

4. Which ram best fits the scenario of increasing scrapie resistance in your flock the fastest? _____

Answer Key:

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Fill in the Blank

1. The summary of the ancestors of a given animal is known as the animal's **Pedigree**.
2. **Rearing Type** refers to the number of lambs raised by a ewe at one time.
3. **Adjusted 60-day Weight** is a measure of the weight of lambs adjusted to 60-days of age.
4. The selection of animals to breed based on the presence of certain traits or performance is known as **Genetic Selection**.
5. A **Dam** is another name for the female parent while the **Sire** is the male parent.
6. **Adjusted 120-day Weight** is a measure of the weight of lambs adjusted to 120-days of age.
7. The term that refers to the number of lambs born in a single lambing is **Birth Type**.
8. **Average Daily Gain** is a term that is used to compare animal performance over a set period of time.

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Questions

1. What are the five factors that Adjusted 60- and 120-days weights are adjusted to account for? **Weaning age, birth type, rearing type, gender and age of dam**
2. How many generations does a normal pedigree show? **Three**
3. What is the most desirable birth type? **Twin**

Performance Data – Southdown Ewes

1. Which Southdown Ewe was likely the heaviest at weaning? **Ewe #1**
2. What is the Birth Type for the ewe that has the lowest overall performance? **Triplet**
3. Which ewe is least likely to maintain the likelihood of having twins in the flock? **Ewe #4**
4. Which 2 ewes are the most desirable based on Birth and Rearing Type and performance? **Ewes #1 and #3**

Answer Key:

Pages 55-57

1. **QQ** Most likely to be infected with scrapie
   QR Moderate risk of scrapie infection
   RR Least likely to be infected with scrapie
2.

Breeding QR Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**
Q	QQ	QQ
R	QR	QR

Results
2 / 4 will have genotype that is most likely to be infected with scrapie
2 / 4 will have genotype that is moderate risk of scrapie infection
0 / 4 will have genotype that is least likely to be infected with scrapie

Breeding RR Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**
R	QR	QR
R	QR	QR

Results
0 / 4 will have genotype that is most likely to be infected with scrapie
4 / 4 will have genotype that is moderate risk of scrapie infection
0 / 4 will have genotype that is least likely to be infected with scrapie

Breeding QQ Ram to your QQ ewes

	Ewes	
Ram	**Q**	**Q**
Q	QQ	QQ
Q	QQ	QQ

Results
4 / 4 will have genotype that is most likely to be infected with scrapie
0 / 4 will have genotype that is moderate risk of scrapie infection
0 / 4 will have genotype that is least likely to be infected with scrapie

3. Answer the below questions.

    a. Which ram will result in 100% of offspring continuing to be the most likely to be infected with scrapie? **QQ ram**

    b. Which ram will result in 50% of offspring having a moderate risk of scrapie infection? **QR ram**

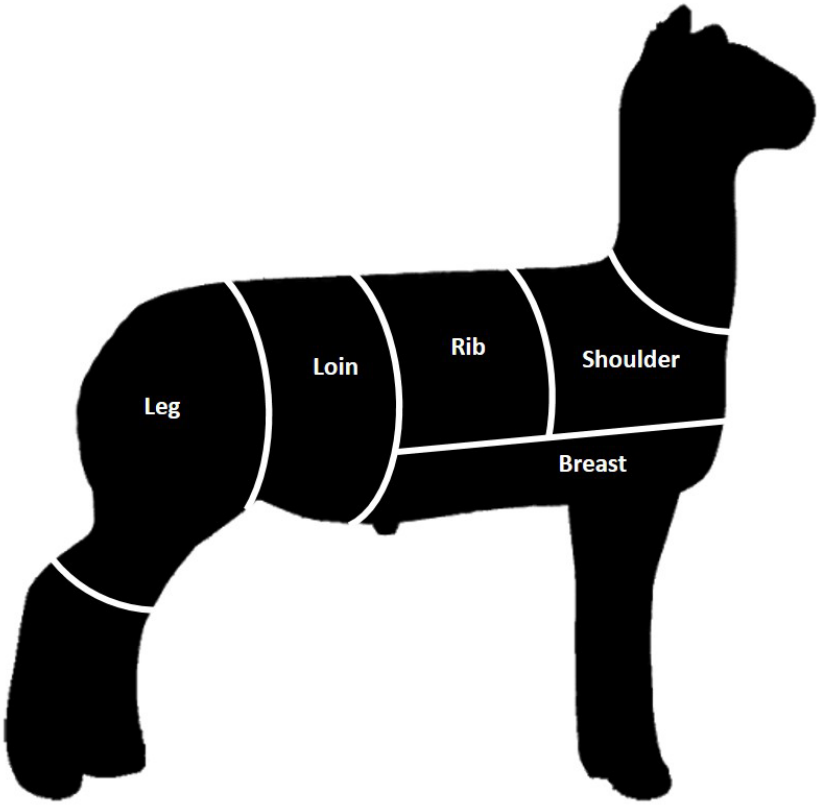
    c. Which ram will result in 100% of offspring having a moderate risk of scrapie infection? **RR ram**

4. Which ram best fits the scenario of increasing scrapie resistance in your flock the fastest? **RR ram**

Chapter 8
Carcass and Lamb Products

Projected Outcomes:

- Understand the difference between lamb and mutton
- Differentiate between muscle, bone and fat on a lamb carcass
- Identify and distinguish between the wholesale cuts of a lamb carcass: breast, leg, loin, rib, shoulder



Key Terms:

- Lamb - meat from a young sheep 12 months or younger
- Mutton - meat from a mature sheep
- Muscle - fibers that makes up the majority of meat and allows an animal to move
- Bone - structural support
- Fat - white pieces within the meat that provide energy to the animal
- Breast - underside of sheep
- Leg - hind leg of sheep
- Loin - hind abdominal area
- Rib - middle abdominal area
- Shoulder - front area of body

The main difference between lamb and mutton is **lamb** is the meat of a younger animal (around a year old), and **mutton** is the meat of an older animal (can be any age older than one year). Lamb has a milder taste whereas mutton has a stronger flavor like the flavor of goat, venison, or wild boar meat. Lamb is more tender and is thus cooked by a variety of methods including roasting, grilling, or braising. Mutton is tougher, so it is usually cooked using a slow cooker, slow-roaster, or meat smoker. Finally, the texture of mutton and lamb is different. Since lamb comes from a younger animal and has not had much time to develop connective tissue, it is more tender and moister. Mutton comes from an older animal and is therefore more tough, dry, and chewy, depending on the cooking method used. Mutton has also had more time to build up more fat and will have a deeper colored meat since the muscles have worked more than the muscles in a lamb.

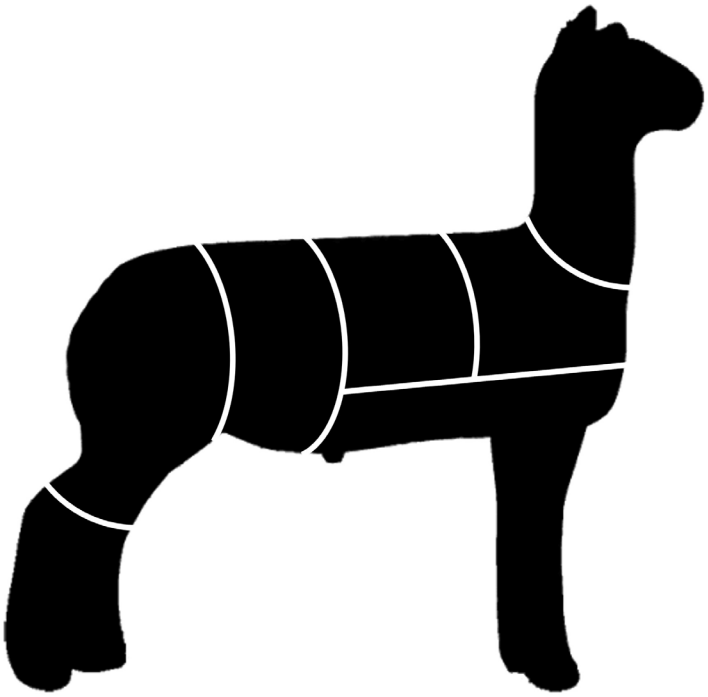
Muscles are soft tissues that include many stretchy fibers. The function of muscles is primarily movement, but different types of muscles have different jobs. The main muscular systems of a sheep include the muscles of the head and neck, shoulders and torso, forelimbs and hindlimbs, and the hips. Sheep muscles are specifically designed for activities such as grazing, walking on all four legs, and escaping predators. Sheep also have small cutaneous muscles directly below the skin that enable them to twitch or shake to dislodge insects and pests. **Bones** provide shape and support for the body as well as protection for some organs. Sheep have approximately 215 individual bones that have different functions and purposes. **Fat** has many functions including giving the sheep energy, protecting organs, supporting cell growth, and absorbing vital nutrients. Fat is essential for lambs because immediately after birth and before they get introduced to feed, they only have one way to regulate and maintain their body temperature: burning fat to generate heat.

There are five main wholesale cuts of meat that are produced from a sheep to create lamb or mutton. There is the **leg**, **loin**, **ribs** or **rack**, **shoulder**, and **breast** or **flank**. The cuts are distinguished by the area the meat comes from or what the muscle being cut for meat is called. For example, the leg cut comes from the hind or back leg region of the animal and is made from the muscles that support the leg. Each cut of meat is used differently when cooked for human consumption and tastes different and may have different textures, creating a different price based on what the desirability of the cut of meat is. The quality of the cut can be determined by the amount of fat within the meat or how tender the meat is when cooked. Some cuts of meat may include the bone still attached when ready for purchase. These qualifications make the leg, loin, and rack more desirable, which increases the price. The shoulder and breast are all considered cheaper in price. These qualities can be used to market the cuts in such a way as to make them more desirable for purchase. Informing the consumer on the quality of the cut, its tenderness, and its flavor profile can entice consumers to purchase a package that they may not have thought about buying before.

Activity:

Instructions: Using the word bank below, match the wholesale cut term to the corresponding body part that makes up the cut, writing directly on the lamb figure. Check your answers on the next page.

Word Bank		
Leg	Loin	Rib
Shoulder	Breast	



Activity:

Instructions: List a few differences between lamb and mutton in the designated area below.

Lamb	Mutton

Label the pictures below on the designated lines if the image is Lamb or Mutton:

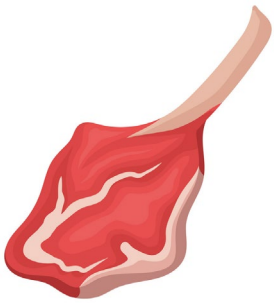
1. _____

2. _____

Activity:

- Materials Needed:
  - Plate
  - Fruit Roll ups
  - Swedish fish
  - Mini Marshmallows or white frosting
  - Pretzel Rods

Instructions: Use the image of the lamb chop to the right for reference.



1. Grab a plate and lay out all working materials in front of you.
2. Starting with the foundation of a cut of meat, use pretzels to represent the bone that sticks out of a lamb chop.
3. Next, add the meat or muscle onto the bones by using the red fruit roll ups for more tender lamb or Swedish fish for tougher mutton.
4. Then, add the fat that surrounds the chop and marbles into the meat using mini marshmallows or frosting.
5. Finally, eat your product!

Chapter 9
Equipment

Projected Outcome:

- Identify the following equipment used in sheep production: balling gun, disposable syringe, ear taggers, emasculator, ewe spoon, hoof trimmers, multiuse syringe, ram marking harness, sheep shears, wool card

Adequate working facilities are imperative for proper management of sheep. It is important to note that adequate does not mean expensive and fancy. Good facilities use sheep behavior principles to properly restrain the animal to ensure safety of people and animals. Some of these principles include interacting with sheep consistently and regularly while remaining calm and relaxed. Sheep are gregarious animals, meaning they like to be with other sheep so use techniques that keep the flock together as much as possible.

Once adequate working facilities are obtained, it is important to be able to identify, use and maintain equipment to maintain health and profitability of the sheep flock. The following pieces of equipment are common to sheep operations.

Key Terms:

Balling Gun: Device used to administer medications in the form of capsules, pills and boluses through the mouth and down the throat.

Disposable Syringe: Syringe used with a needle to administer injections, typically used in one setting and then discarded. Needles still need to be changed after each animal. It can also be used to give oral medications in small amounts.

Ear Tagger: Tool used to administer an ear tag in an animal's ear. It is important to ensure that the tags are matched to the correct tagger.

Emasculator: Castration tool used to clamp the spermatic cords while simultaneously cutting the cord so the testicles can be removed, crushing prevents extreme blood loss.

Ewe Spoon: Plastic device with strings used to put a prolapsed uterus back into the ewe

Hoof Trimmers: Scissors-type tool used to trim hooves

Multi-use Syringe: Syringe used with a needle to administer injections. Can be disinfected between each use so can be used over a period of time. Needles still need to be changed after each animal. It is typically used when giving the same injection to multiple animals at the same time.

Ram Marking Harness: A harness with a color marker on the chest that rubs color onto the ewe when the ram mounts. This is used to determine the ewes that have been mounted in an attempt to be bred by the ram.

Sheep Shears: Electric clippers that are used when completely shearing sheep.

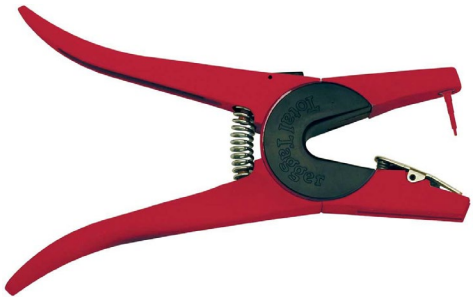
Hand Shears: Scissors-type hand tool used to trim wool from the body of a sheep.

Wool Card: A brush to untangle wool and align it together. These may be used during grooming or show preparation.

Identify the equipment based on the descriptions above.

_____

_____



_____

_____

_____

_____

_____


MATINGMARK
CRAYON - COLD BLUE
CRAYON - BLEU FROID
CAMBIAR - AZUL FRÍO
KLEURBLOK - KOUD BLAUW
Slit here to remove cotter pin, if required.
Raje aquí para quitar la chaveta, si está requerido.
Fendez ici pour enlever la goupille fendue, s'il y a lieu.
Indien nodig, open hier om de splitpen te verwijderen.
Rurtec
Box 10432, Hamilton, NZ
www.rurtec.com
9 421015 580294

Chapter 10
Record-Keeping

Projected Outcomes:

- Understand the importance of proper record-keeping and how it relates to all areas of production

A proper record-keeping system is essential to managing a profitable sheep operation. In essence, a producer will not know if they are profitable without records. There are many types of records that will prove useful to a sheep flock. These could include production records (birth weight, weaning weight), breeding records (lambing percentage, individual sire and dam records) and economic records (feed costs, selling price of lambs).

Health records are likely the most important type of record. Assuring a safe, wholesome food supply should be one of the most important goals of all sheep producers. This goal cannot be met without proper health records. It is essential to ensure that all medications are given according to their label instructions and that the withdrawal times for all medications are met before marketing any animal. This is achieved following all of the instructions on the medicine label. Below are important health related records:

- **Individual Animal Identification:** the unique identifier for a given animal in the flock, commonly an ear tag
- **Medication Name:** the name of the medicine that is given
- **Date of Administration:** date the medicine is given
- **Dosage:** amount of medication that is given
- **Route of Administration:** the manner in which the medicine is given (eg. intramuscularly, subcutaneously, intravenously, orally)
- **Withdrawal Time:** time between last treatment and the point where animal can enter the food chain, typically listed in days

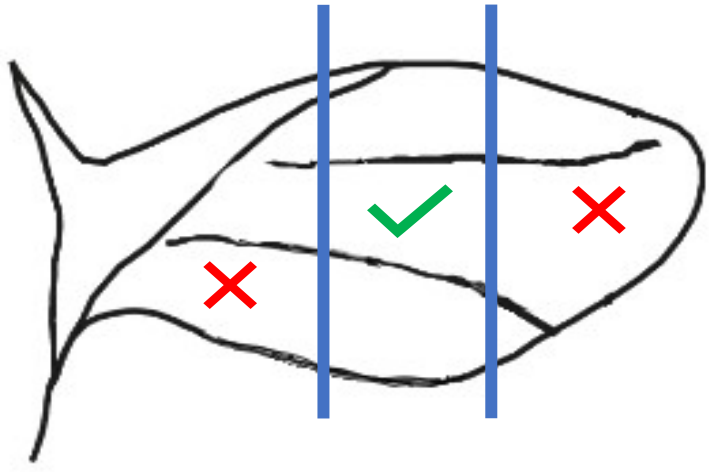
Individual animal identification is a key piece to proper record-keeping and management. Without being able to attribute production or breeding records to an individual ewe, selection is basically guesswork. Sound culling decisions are made from collected data over time that are made possible through individual animal identification. The ear tag is the most common form of individual animal ID for sheep. It is important to note that ear tags are considered temporary as they are commonly ripped out of the ear.

- **Flock Ear Tag:** This is a plastic tag placed in either ear with numbers/letters typically able to be seen from a distance.

- **Scrapie Ear Tag:** A scrapie tag is federally approved tag that features a series of numbers and letters that consists of the flock ID as well as individual animal ID. They also feature the US seal to show that they are considered official animal ID.

Ear Tagging Activity

Ear tags are most often placed in the middle third of the ear between the ridges. Too far inside is too thick and can cause pain/stress on the animal which too far outside can result in increased risk of ripping out the tag.



Print and cut out copies of the below blank ear and use an ear tagger to practice where to place the ear tag in your sheep. If you do not have access to an ear tagger, use a pen or marker to draw a picture of an ear tag in the correct place on the lamb's ear.

Record-Keeping Activities

There are many types of records that are kept by sheep operations. Below are examples of common record-keeping systems.

Answer the below questions related to your own system of record-keeping.

1. Do you keep records for managing your sheep flock?
2. If not, determine which records would be useful to you and begin to keep these records.
3. If so, how do these examples compare to the records that you keep for your sheep?
4. If there are records that you do not keep, explain why you don't keep them. How might it be beneficial to you to start?
5. By completing a web search, find 5 records that are not included in the below examples and explain how they would be useful in your sheep management.

Production Records

Date	Lamb ID	Sire	Dam	Gender	Birth Type	Birth Weight	Weaning Date	Weaning Weight	Comments
1/25/2023	*2301*	*Crockett*	*1905*	*Wether*	*TW*	*8*	*4/30/2023*	*55*	*Sold*
1/25/2023	*2302*	*Crockett*	*1905*	*Ewe*	*TW*	*7*	*4/30/2023*	*53*	*Retained*
1/26/2023	*2303*	*Crockett*	*1910*	*Ewe*	*S*	*	*	*	*Stillborn*

Health Records

Date	Animal ID	Weight	Product	Route	Dosage	Withdrawal Time	Given By
2/15/2023	*2301*	*25*	*CDT Vaccine*	*SQ*	*2ml*	*21 days*	*DC*

Financial Records

Date	Description	Expense/Income Amount	Running Total
9/10/2023	*Sold culled ewe*	*250*	*$250*
9/12/2023	*Bought 2 bags of feed (variable)*	*-25*	*$225*
9/15/2023	*Rent payment for land (fixed)*	*-150*	*$75*

Congratulations! You have now completed the Beginner Sheep Project Area Guide.

For more opportunities in the sheep project area, you may talk with your 4-H agent about the following contests and activities:

- Youth for the Quality Care of Animals Certification
- Livestock Skillathon Contest
- Livestock Judging Contests
- Sheep Shows and Showmanship

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