

Dairy Project Area Guide Intermediate

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Dairy Project

Click on each activity number below to be taken to where it appears in the document. We recommend reading over Dairy Project 1-2 years before continuing.

Unit 1: Breed
Activity 1.1 Name That Breed!
Activity 1.2 Pin the Breed on the Map
Activity 1.3 Dairy Species
Activity 1.4 What's in a Breed?
Unit 2: External and Skeletal Parts, Confirmation and Structure
Activity 2.1 Label the Dairy Cow
Activity 2.2 Udder Fun!
Unit 3: Health and Disease
Activity 3.1 Vaccines Save Lives!
Activity 3.2 How do you Give a Shot?
Medication Label Versus Medication Insert
Activity 3.3 Health Terms Crossword
Activity 3.4 How do you Drench Cattle?
Activity 3.5 Basics of Biosecurity
Activity 3.6 Disease Scrabble
Activity 3.7 Gross Parasites!
Activity 3.8 Let's Hoof It!
Unit 4: Equipment and Records
Activity 4.1 Equipment Matching
Activity 4.2 Average Daily Gain and Rolling Herd Average
Activity 4.3 Understanding Records
Activity 4.4 Cow Identification
Unit 5: Nutrition and Feeding
Activity 5.1 Label the Digestion Tract
Activity 5.2 Nutrition Word Search
Activity 5.3 Understanding Colostrum
Activity 5.4 Nutrition Crossword
Activity 5.5 Nutrition Scramble
Activity 5.6 What's for Dinner?
Unit 6: Genetics and Reproduction
Activity 6.1 Genetic Scramble
Activity 6.2 Label the Reproduction Tract
Activity 6.3 Reproduction Rescue
Activity 6.4 Guessing Genomics
Unit 7: Dairy Products and Processing
Activity 7.1 Pasteurization Party
Activity 7.2 What Equipment is Used Where?
Activity 7.3 There is a Cow in My Marshmallow!



Dairy Project

Unit 8: Performance Measurements
Activity 8.1 Too Cull or Not To Cull?
Activity 8.2 Cattle Calculations
Activity 8.3 Score!
Unit 9: Economics and Marketing
Activity 9.1 FMMO: Federal Milk Marketing Orders
Activity 9.2 Money In; Money Out



Dairy

Unit 1: Breed

Project Outcomes Addressed:

- Describe the origins of the seven main breeds of dairy cattle.
- Identify three commonly used dairy species and explain why they are commonly used.
- Identify and describe two minor dairy cattle breeds.

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. Name That Breed!
2. Pin the Breed on the Map
3. Dairy Species
4. What's in a Breed?

Breed Overview

The United States of America recognizes seven different dairy cattle breeds. Can you name them all below? Each breed has different genetic traits, characteristics and origins. In this unit, you will name the seven different breeds, locate their origins, describe breed characteristics and even name three different dairy species.



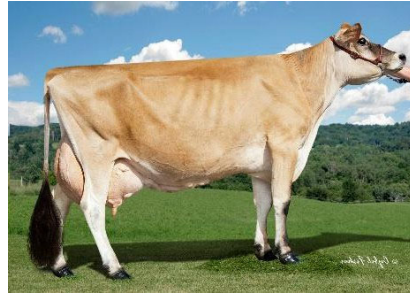
Activity 1.1

Name That Breed!
Can you name all seven dairy cattle breeds?

1. _____



2. _____



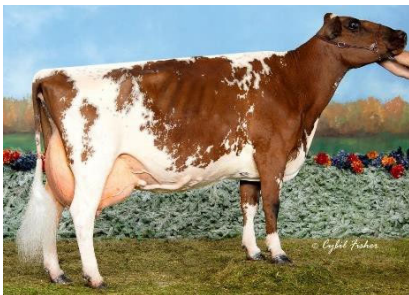
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4. _____



5. _____



6. _____

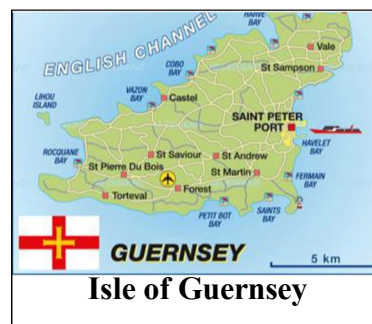
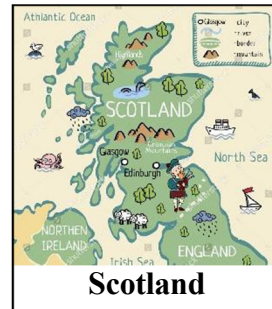
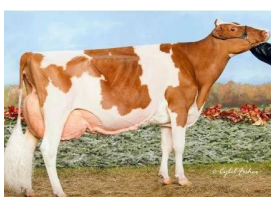
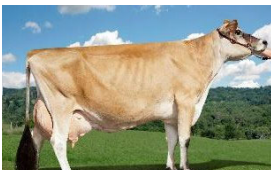


7. _____

Activity 1.2

Pin the Breed on the Map

Draw a line from each breed to the location of its origin. Some breeds may originate from the same location.



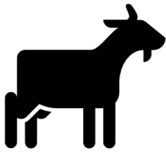
Activity 1.3

Dairy Species

Name three species that provide dairy products.

1. _____ 2. _____ 3. _____

Each of the three species are known to produce certain dairy products. List a product that each species is known to produce. Do not repeat a product.



a. _____



b. _____



c. _____



Activity 1.4

What's in a Breed?

Below are some characteristics and genetic traits specific to six minor breeds. The objective is to identify and describe two minor dairy breeds. After reading choose two minor breeds and make an infographic to describe them.

Danish Red	Fleckvieh	Dexter Cattle
<p>Major dairy cattle breed in northern Europe</p> <p>Solid red color</p> <p>When crossbred with Holstein Friesian, they produce yielding milk with high butterfat and protein</p>	<p>Originated in central Europe in the 19th century</p> <p>Considered a dual breed</p> <ul style="list-style-type: none"> Can be used for both dairy and beef <p>Can be solid red or red pied and can be polled or horned</p> <p>Bulls have a faster growth rate allowing for slaughter at earlier times</p>	<p>Small frame (roughly 600 to 700 pounds)</p> <p>Can be red, black, or dun (brown) colored</p> <p>Originated in Ireland</p> <p>Similar to a jersey, milk is rich and high in butterfat</p> <p>Very maternal</p>
Montbéliarde	Lakenvelder	Norwegian Red
<p>Originated in eastern France</p> <p>Large dairy frame cattle (roughly 1,300 to 1,500 pounds)</p> <p>Milk protein is well suited for cheesemaking</p> <p>Known for better longevity, fertility, and lower cell counts</p>	<p>Originated in the Netherlands</p> <p>Derives from Gurtenvieh or belted Braunvieh cattle</p> <p>Also known as Dutch Belted</p> <p>Become endangered during the last century</p>	<p>Known for selective broad breeding with increasing emphasis on functional traits like health and fertility</p> <p>Developed in 1935 in Norway</p> <p>Large frame (1,410 to 1,500 pounds)</p> <p>Can be red or black and white</p>



Extra Sources

Breed Characteristics and Origins:

- More information:

Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

- Games:

Link: <https://www.purposegames.com/game/dairy-breeds>

Link: <https://www.purposegames.com/game/dairy-cattle-breeds-quiz-game>

Link: <https://www.purposegames.com/game/dairy-breeds-and-their-characteristics>

Dairy Species:

- More information:

Link: <https://www.fao.org/dairy-production-products/production/dairy-animals/en/>

Link: <https://animalsmart.org/feeding-the-world/products-from-animals#:~:text=Dairy%20cows%20are%20another%20type,cream%20cheese%20and%20condensed%20milk.>










Answer Key

Unit 1: Breed

Activity 1.1

1. Guernsey
2. Jersey
3. Shorthorn
4. Holstein
5. Ayrshire
6. Brown Swiss
7. Red and White

Activity 1.2

	Europe
	Isle of Jersey
	Europe
	Isle of Guernsey
	United States and Canada
	Switzerland
	Scotland

Activity 1.3

*Any order is correct

1. Goat*
2. Sheep*
3. Cattle*
 - a. Goat: Milk, cheese, soap/lotion, others might apply
 - b. Sheep: Soap/lotion, cheese, others might apply
 - c. Cattle: Milk, cheese, ice cream, yogurt, others might apply



Dairy

Unit 2: External and Skeletal Parts, Confirmation and Structure

Project Outcomes Addressed:

- Name and locate 20 body parts.
- Identify the following three udder structures and describe their importance:
 - Median suspensory ligament
 - Fore-udder attachment
 - Rear-udder attachment

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. Label the Dairy Cow
2. Udder Fun!

Confirmation and Parts of the Body Overview

Anatomy is a complex way of saying the structure and internal workings of the dairy cow that help keep it functioning and healthy. There are over 40 body parts of a dairy cow, but for this activity we are going to focus on 20 of them. There are 5 parts of the external udder, but for this activity, we are going to focus on 3 of them.



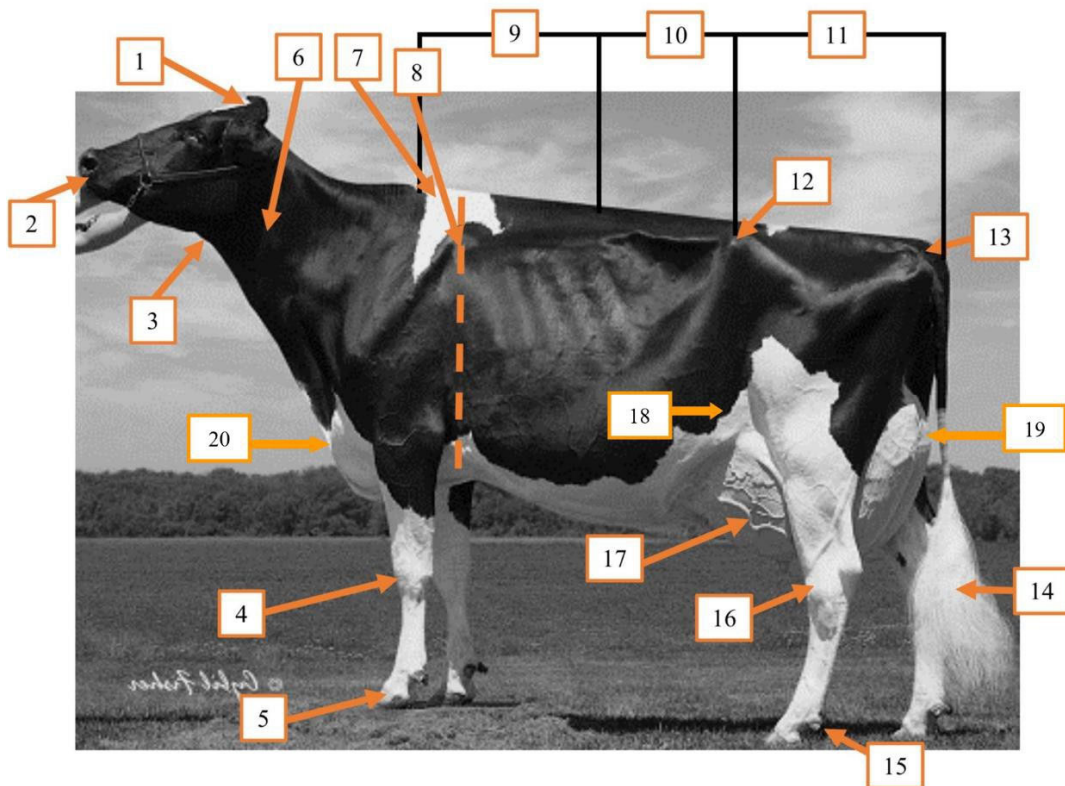
Activity 2.1

Label the Dairy Cow

Do you think you could label the basic body parts of the cow? Using the image and word bank below, label the body parts correctly.

Word Bank

Flank	Poll	Throat	Neck	Switch
Rear udder	Heart girth	Brisket	Knee	Chine
Loin	Rump	Udder	Tail head	Hoof
Hip	Dewclaw	Hock	Withers	Muzzle



Activity 2.1: Place answers here.

1. _____

11. _____

2. _____

12. _____

3. _____

13. _____

4. _____

14. _____

5. _____

15. _____

6. _____

16. _____

7. _____

17. _____

8. _____

18. _____

9. _____

19. _____

10. _____

20. _____



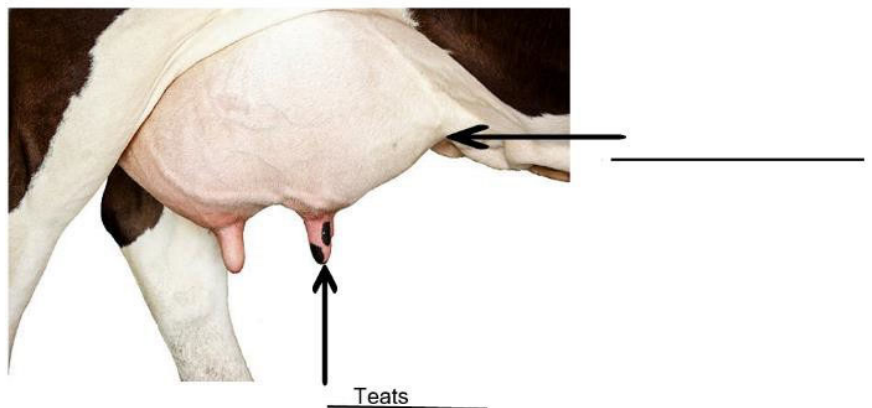
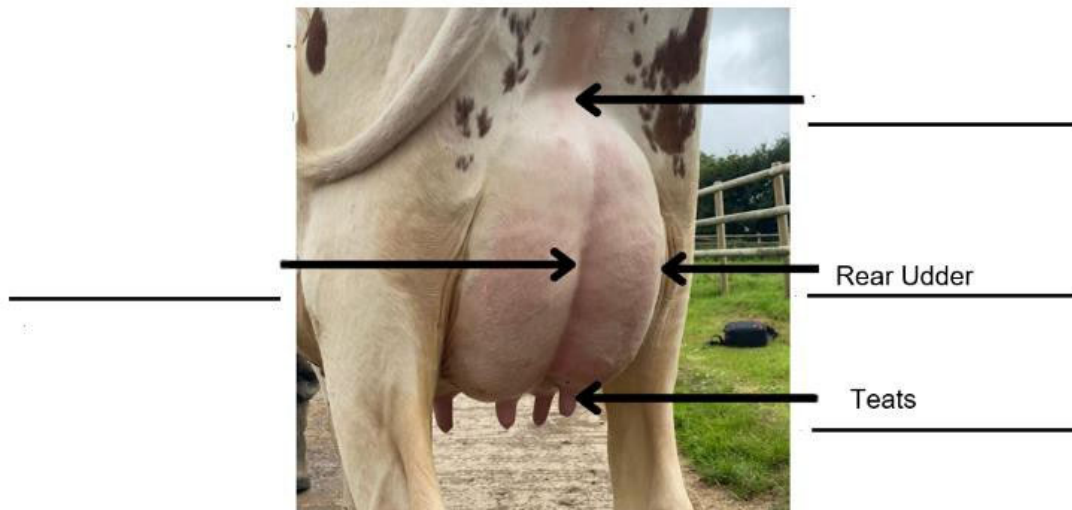
Activity 2.2

Udder Fun!

Do you think you could label the parts of the udder? First, draw a line from the part of the udder to the correct description. Using the image and word bank below, label the udder parts correctly.

Rear-udder attachment	Fore-udder attachment	Median suspensory ligament
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The higher the attachment the greater the strength, which will lead to increased udder capacity	Supports the entire udder	Defines the strength of the lateral suspensory ligament
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Extra Sources

Parts of the Cow:

- More information:

Link:

<https://afs.ca.uky.edu/livestock/dairy/parts>

Link: <https://animalcorner.org/cow-anatomy/>

Link: <https://www.gov.mb.ca/agriculture/industry-leadership/4h/pubs/judge-dairy-factsheet.pdf>

- Games:

Link: <https://www.purposegames.com/game/dairy-cattle-parts-game>

Link: <https://www.purposegames.com/game/parts-of-a-dairy-cow-quiz>

Link: <https://4h.extension.wisc.edu/4h-resources/dairy-parts-quiz-answer-key/>

Parts of the Udder:

- More information:

Link: <https://www.gov.mb.ca/agriculture/industry-leadership/4h/pubs/judge-dairy-factsheet.pdf>

Link: https://uwmril.wisc.edu/wp-content/uploads/sites/306/2021/08/1_TECH_1_CowIntroUdderAnatomy.pdf

- Games:

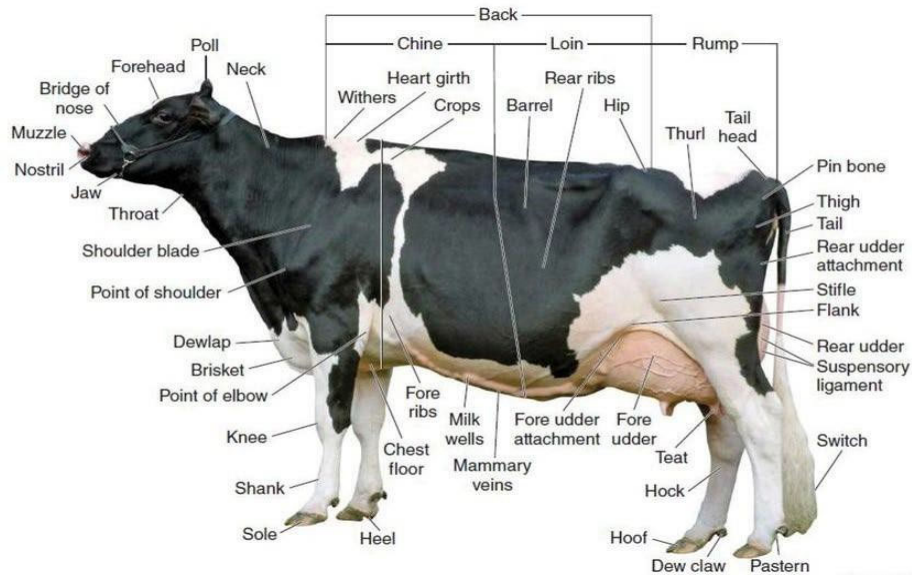
Link: <https://www.purposegames.com/game/dairy-cow-udder>



Answer Key

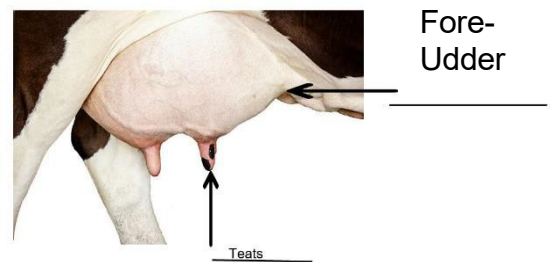
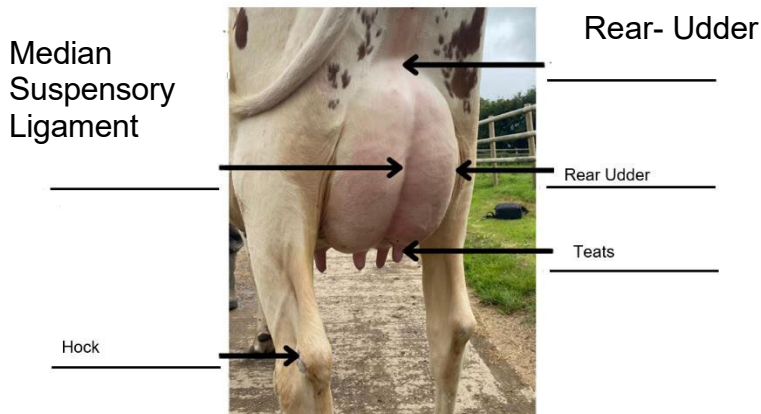
Unit 2: External and Skeletal Parts, Confirmation and Structure

Activity 2.1



Activity 2.2

Rear-udder attachment	Fore-udder attachment	Median suspensory ligament
The higher the attachment the greater the strength, which will lead to increased udder capacity	Supports the entire udder	Defines the strength of the lateral suspensory ligament



Dairy

Unit 3: Health and Disease

Project Outcomes Addressed:

- Explain how animals develop immunity from vaccination.
- Demonstrate how to give an intramuscular and a subcutaneous injection.
- Identify all 10 parts of a medication insert.
- Define the following terms: resistance, susceptible, pathogens, scours, dehydration, dewormer, electrolyte, heat stress, necropsy, persistently infected, prevention, temperature-humidity index, and treatment.
- Demonstrate the proper method of administering a drench.
- Understand quality assurance regarding injection sites, withdrawal times, residues and using a medication label.
- Differentiate between modified-live and killed vaccines.
- Explain the difference between a medication label and a medication insert.
- Identify terminology associated with biosecurity for a livestock operation or livestock project.
- Define the following: coccidiosis, acidosis, metritis, ketosis, milk fever, lameness, pneumonia, pinkeye, bloat and mastitis.
- Identify internal and external parasites in dairy cattle.
- Label the cross-section of the claw and anatomical structure of the hoof.

You will need:

- Pencil
- Scissors

Activities in this unit:

1. Vaccinations Save Lives!
2. How do you Give a Shot? & Medication Label Versus Medication Insert
3. Health Terms Crossword
4. How Do You Drench Cattle?
5. Basics of Biosecurity
6. Disease Scrabble
7. Gross Parasites!
8. Let's Hoof It!



Activity 3.1

Vaccinations Save Lives!

Why give vaccines?

Vaccines are given to lower the risk of disease. Vaccines provide added insurance for cattle producers to protect their herds from many different diseases.

What is the goal of vaccination?

The purpose of vaccinating is to protect the herd from harmful diseases for health, economic and welfare reasons. To provide protection, the immune system must develop memory. With each vaccination and booster, the goal is to provide the protection needed by triggering the immune system to recognize the disease.

Are vaccines 100 percent effective?

Most vaccines do not prevent infection; instead, they prevent clinical disease. It is important to note that vaccines are not absolute protection. The immune system can be overwhelmed even if a vaccine is in place. If cattle become immune-compromised or exposed to an extremely high number of pathogens (disease-causing organisms), the vaccine may fail to protect from clinical disease.

Types of vaccines:

Modified-live vaccine (MLV)

- Non-disease-causing version of the virus or bacteria
- The live virus or bacteria replicates in the animal similar to how the actual disease would, but it does not cause the disease itself.
- They help the immune system develop a full response and create immunity.

Killed vaccines

- Killed vaccines do not contain a live virus or bacteria
- They contain a dead organism or specific piece of an organism that is critical to the function of the disease-causing virus or bacteria.
- Boosters or second vaccinations are needed more often with killed vaccines.

Combined vaccines

- Contain both modified-live and killed products

There are six pairs of cards on the next page. Cut out the cards and shuffle them. Match each card to the correct term. Can you do it?



Do not contain a live virus or bacteria	Killed Vaccine	Non-disease-causing version of the virus or bacteria
Modified-Live Vaccine	Contain both modified live and killed products	Killed Vaccine
Boosters or second vaccinations are needed more often	Modified-Live Vaccine	Killed Vaccine
It helps the immune system develop a full response and create immunity	Combined Vaccine	Contain a dead organism or specific piece of an organism that is critical to the function of the disease-causing virus or bacteria



BLANK PAGE FOR CUT OUTS



Activity 3.2

How do you give a shot?
Medication Label VS Medication Insert

Types of injections:

- Intravenous (IV)
 - Injected into the blood stream directly through veins
- Intramuscular (IM)
 - Injected into the muscle
- Subcutaneous (SC)
 - Injected under the skin
- Intradermal (ID)
 - Injected between layers of the skin

Watch this video on how to give a shot:

Link: <https://www.youtube.com/watch?v=hdCfGgsp4tQ>

Medication Label Versus Medication Insert

Medication label:

- A written, printed or graphic matter upon or any of its container or accompanying such as a drug
- Seeks to identify drug contents and to state specific instructions or warnings for administration, storage, and disposal

Medication insert:

- Provides information about the drug and its use.
- For prescription medications, the insert is technical, providing information for medical professionals about how to prescribe the drug.

Quality Assurance:

Injection sites

- Located the injection site detail under the route of administration

Withdrawal times

- The time between the last drug treatment and the sale of milk or slaughter. It is the time required for the drug residue to be reduced to safe levels for human consumption.

Residues

- Watch the video below:
- Link: <https://www.youtube.com/watch?v=nrLDsfGMX9s>



Can you fill in the blanks and label the medication label and medication insert?

Medication Label

OMNIBIOTIC

(hydrocillin)

Directions for use: See package insert

Warning: The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food. Exceeding the highest recommended dosage level may result in antibiotic residues in meat or milk beyond the withdrawal time.

Store between 2° and 8° C (36° and 46° F)

Keep dry and keep away from light

Net Contents: 100 ml

Distributed by

USA Animal Health, Inc.



Word Bank for Label

Storage	Quantity of Contents	Cautions and Warnings	Active Ingredients
Name of Drug	Withholding Times	Name of Distributor	



Medication Insert

OMNIBIOTIC

(Hydrocillin in Aqueous Suspension)

For use in Beef Cattle, Lactating and Non-Lactating Dairy Cattle, Swine and Sheep

Read Entire Brochure Carefully Before Using This Product

For Intramuscular Use Only

Active Ingredients: Omnibiotic is an effective antimicrobial preparation containing hydrocillin hydrochloride. Each ml of this suspension contains 200,000 units of hydrocillin hydrochloride in an aqueous base.

Indications: Cattle - bronchitis, foot rot, leptospirosis, mastitis, metritis, pneumonia, wound infections. **Swine** - erysipelas, pneumonia.

Sheep - foot rot, pneumonia, mastitis; and other infections in these species caused by or associated with hydrocillin-susceptible organisms.

Recommended Daily Dosage

The usual dose is 2 ml per 100 lb of body weight given once daily. Maximum dose is 15 ml/day.

Body Weight	Dosage
100 lb	2 ml
300 lb	6 ml
500 lb	10 ml
750 lb or more	15 ml

Continue treatment for 1 to 2 days after symptoms disappear.

Caution: 1. Omnibiotic should be injected deep within the fleshy muscle of the neck or thigh. Do not inject this material in the hip or rump, subcutaneously, into a blood vessel, or near a major nerve because it may cause tissue damage. 2. If improvement does not occur within 48 hours, the diagnosis should be reconsidered and appropriate treatment initiated. 3. Treated animals should be closely observed for at least 30 minutes. Should a reaction occur, discontinue treatment and immediately administer epinephrine and antihistamines. 4. Omnibiotic must be stored between 2° and 8° C (36° to 46° F). Warm to room temperature and shake well before using. Keep refrigerated when not in use.

Warning: Milk that has been taken from animals during treatment and for 48 hours (4 milkings) after the last treatment must not be used for food. The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food.

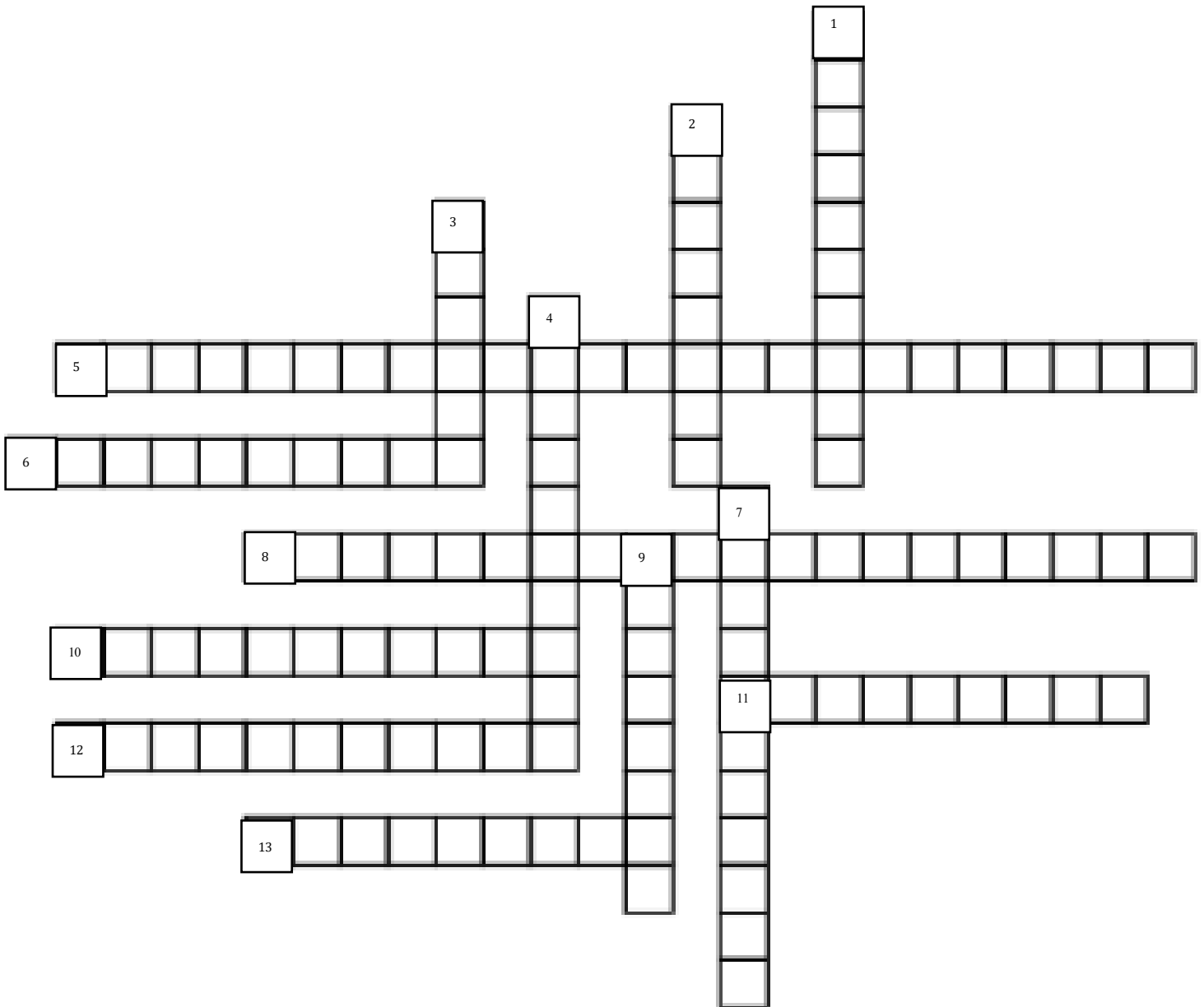
How Supplied: Omnibiotic is available in vials of 100 ml.



Activity 3.3

Health Terms Crossword

Fill in the crossword with the appropriate word for each definition using the word bank on the next page.



Word Bank for Crossword

Heat stress	Necropsy	Susceptible	Electrolyte	Resistance
Persistently infected	Pathogens	Temperature-humidity index	Treatment	Dehydration
Dewormer	Scours	Prevention		

Down:

1. Action taken to decrease the chance of getting a disease or condition
2. An anthelmintic drug given to animals to rid them of parasite
3. Diarrhea in horses and cattle caused by intestinal infection
4. Lack of sensitivity to a drug especially as a result of continued exposure or genetic change
7. A substance that breaks up into ions (particles with electrical charge) when it is dissolved in water or body fluids
9. The examination of an animal after death

Across:

5. A single value representing the combined effects of air temperature and humidity associated with the level of thermal stress
6. Occurs when the body cannot get rid of excess heat
8. The continued presence of infectious virus following the primary infection
10. A condition that occurs when the body loses too much water and other fluids that it need to work normally
11. Medical care given to a patient for an illness or injury
12. Easily affected by a disease; is more likely to get a disease; or lacks resistance to get a disease
13. An organism causing disease to its host



Activity 3.4

How Do You Drench Cattle?

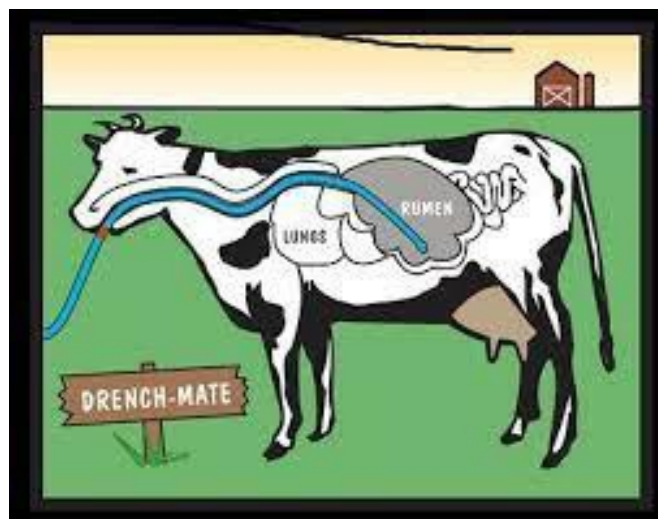
What is drenching?

Drenching is used to balance the diet of dairy cows and to provide protection against metabolic and other illnesses. Products commonly administered include bloat preventatives, magnesium, zinc to support metabolic processes and trace elements including cobalt and selenium.

Watch the following video on how to drench cattle:

Link: <https://www.youtube.com/watch?v=PrgjRFp10nQ>

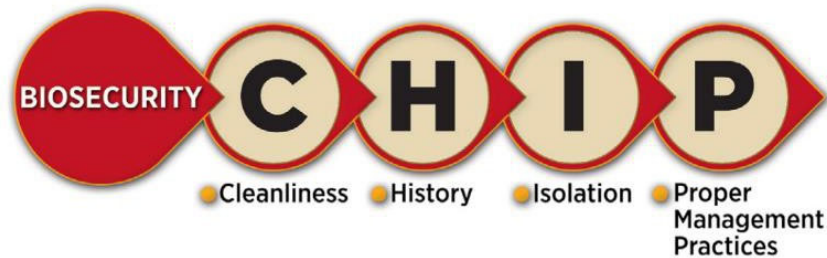
Write three to five sentences on how to drench cattle.



Activity 3.5

Basics of Biosecurity

Biosecurity is defined as procedures intended to protect humans and animals against disease or harmful biological agents.



Complete this activity booklet with adult supervision:

Link: https://www.canr.msu.edu/animal_science/uploads/files/4H1661_AnimalScienceAnywhere-Biosecurity_NEW.pdf



Activity 3.6

Disease Scrabble

Some information about a disease is on the left side of the page. Determine which disease is being described and write out your answer in the blanks. Only put one letter per blank. At the end use the numbered letters to decode the message at the bottom.

The word bank is on the last page of the activity.

<ul style="list-style-type: none"> ○ One of the most common diseases in dairy calves ○ Fever (rectal temperature over 103°F, rapid respiratory rate, coughing, nasal discharge) ○ Prevention: colostrum management, ventilation, vaccination and nutrition 	<p>----- 6 11 16</p>
<ul style="list-style-type: none"> ○ Metabolic disease caused by a low blood calcium level ○ Symptoms: dry muzzle, cold legs and ears, constipation, drowsiness ○ Treatment: replenish cow with calcium solution ○ Prevention: adequate feeding practices; feeding lower amounts of calcium during the dry period; feeding a negative anion diet (DCAD diet) during the dry period 	<p>----- 16 12 18 4</p>
<ul style="list-style-type: none"> ○ Inflammation of the uterus ○ Caused by a bacterial infection ○ Usually occurs after calving complicated by dystocia, retained fetal membranes, twins or stillbirths ○ Symptoms: fever, vaginal discharge, uterus contains extra fluid, cow goes off feed 	<p>----- 7 9 13</p>
<ul style="list-style-type: none"> ○ Caused by infection with a single-celled parasite ○ Symptoms: diarrhea (watery and loose), colic, depression, loss of appetite and weight loss ○ Treatment: none; fluid therapy and nutritional support ○ Prevention: separate infected calves from healthy calves, good sanitation practices 	<p>----- 17 8</p>
<ul style="list-style-type: none"> ○ Metabolic disease ○ pH of rumen falls to less than 5.5 (normal is 6.5 to 7.0) ○ When pH falls: rumen stops moving (depresses appetite and production) and acid-producing bacteria take over the rumen ○ Causes: feeding a high level of rapidly digestible carbohydrate (feeding increased concentrates compared to forage) ○ Symptoms: reduced feed intake, diarrhea, lethargy ○ Prevention: reduce amount of readily fermentable carbohydrate consumed at each meal 	<p>----- 3</p>



Activity 3.6

Disease Scrabble Continued

<ul style="list-style-type: none"> ○ Inflammation of clear outer layer of eye (cornea) and the pink membrane lining the eyelids ○ Highest during the summer ○ Symptoms: sensitivity to light, redness of eye, reduced feed intake ○ Prevention: fly control, providing shade, reduce overcrowding 	<p>-----</p> <p>5</p>
<ul style="list-style-type: none"> ○ Inflammation or infection of the mammary gland ○ Symptoms: udder is swollen, hot, hard, red and painful. Milk is watery and has flakes or clots present. Reduced milk yield, increase in body temperature, lack of appetite ○ Prevention: good housing management, effective teat preparation and disinfection, regular testing and maintenance of milking machine, vaccination for environmental mastitis ○ Most costly disease in the dairy industry 	<p>-----</p> <p>1</p>
<ul style="list-style-type: none"> ○ Increase in the gas pressure within the rumen ○ Cause: consumption of lush legume pasture species in the spring ○ Symptoms: off feed, reluctant to move, appear distressed, rapid breathing ○ Prevention: pasture management 	<p>-----</p> <p>19</p>
<ul style="list-style-type: none"> ○ Metabolic disorder that occurs when energy demands exceed energy intake and result in negative energy balance ○ Low blood glucose concentrations ○ Most common in first few weeks of lactation ○ Symptoms: reduced milk yield, weight loss, reduced appetite, acetone smell on breath ○ Prevention: adequate feeding practices 	<p>-----</p>
<ul style="list-style-type: none"> ○ Commonly a disease of young cattle (1-2 months to 1 year) ○ Usually sporadic during the wet seasons of the year ○ Most characteristic sign is watery feces ○ Infected calves should be removed from the rest 	<p>-----</p> <p>2 15</p>
<ul style="list-style-type: none"> ○ Due to injury or disease in the foot or leg (laminitis, claw disease, digital dermatitis, and foot rot) ○ Symptoms: pain and discomfort, lowered milk yields ○ Prevention: hoof trimming, nutrition, housing and environment 	<p>-----</p> <p>14</p>

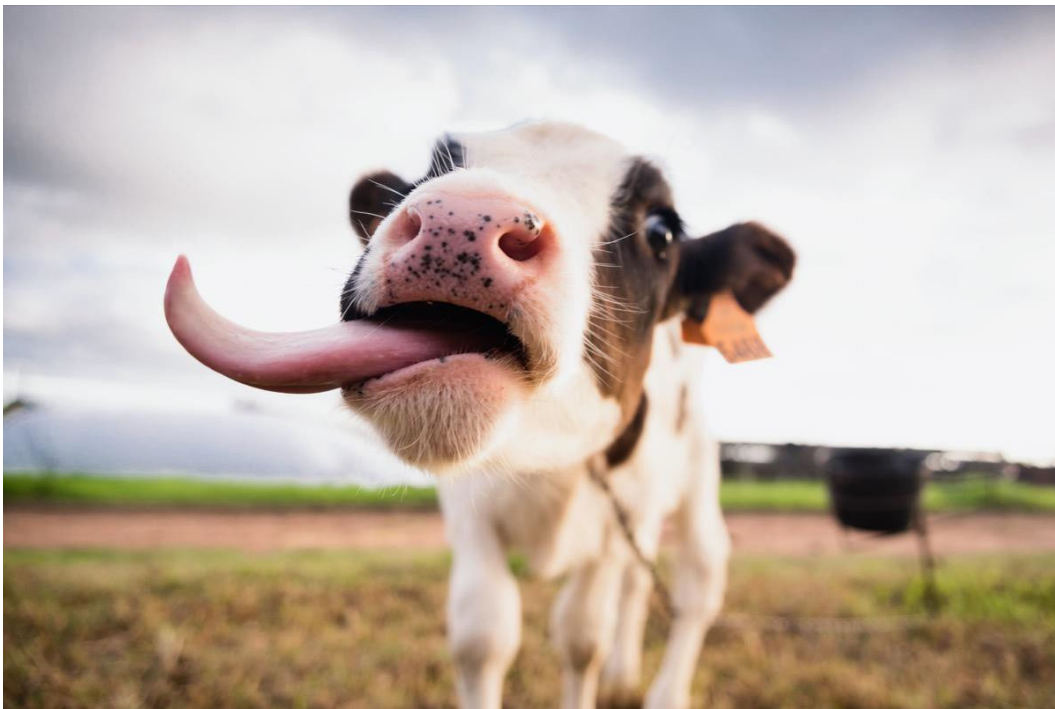


Word Bank for Scrabble

Coccidiosis	Cryptosporidiosis	Acidosis	Metritis	Ketosis
Milk fever	Lameness	Pneumonia	Pinkeye	Bloat
Mastitis				

Joke 1: 1 2 3 w 5 6 1 6 7 1 8 9 h q 11 1 12 7 5 13 2 1 14 14 7 15
1 16 5 14 12 13 h 1 12 7.

Joke 2: W h 17 15 3 2 3 w 13 h 1 4 7 h 3 3 4 7 13 5 6 13 9 7 1 15
3 18 9 h 7 17 ? 19 7 2 1 11 13 7 9 h 7 17 1 8 7 14 1 2 9 3 13 7.



Activity 3.7

Gross Parasites!

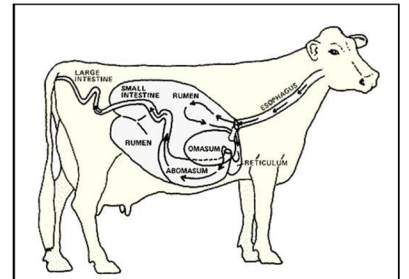
Match the parasite to the location in which it can be found. Some locations can be used more than once.



Roundworms



Lice



Small Intestines



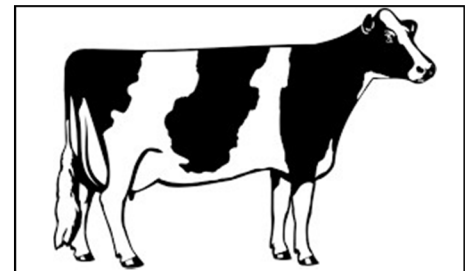
Fly



Head and Neck



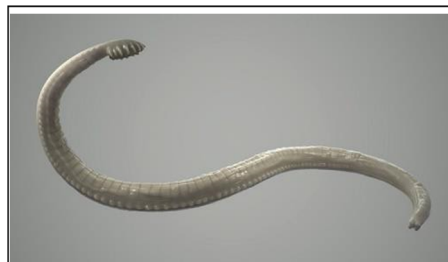
Mite



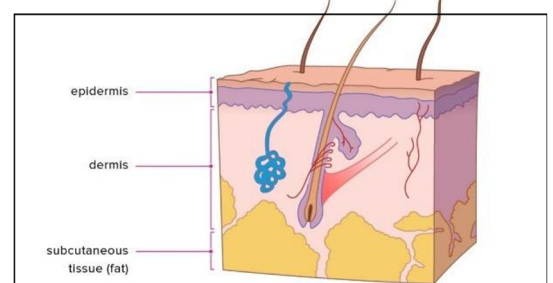
Body of the Cow



Tick



Tapeworm



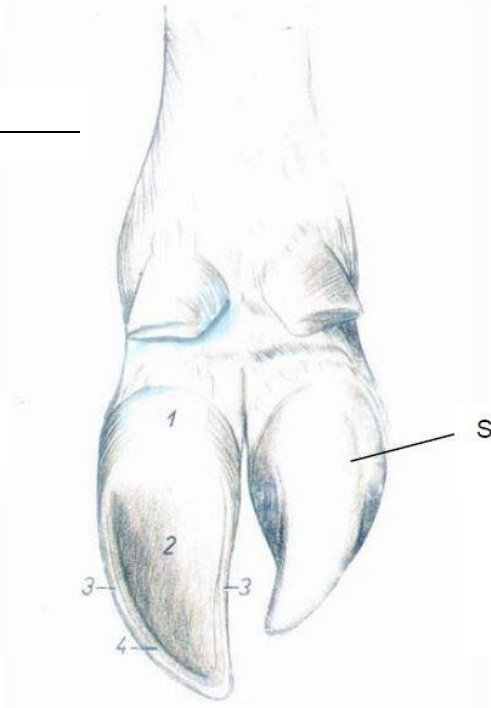
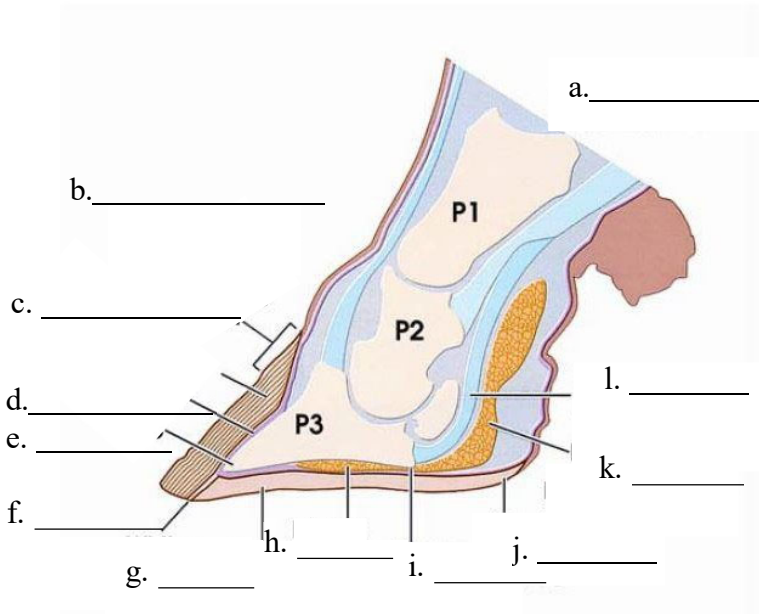
Inbetween Skin Layers



Activity 3.8

Let's Hoof It!

Label the interior and exterior of a dairy cow's hoof.



Solar corium (claw without horn)

1. _____
2. _____
3. _____
4. _____
5. _____

Word Bank for Interior Hoof

Heel	White line	Superficial flexor tendon
Flexor tuberosity of P3	Sole	Deep flexor tendon
Navicular bone	Dorsal Hoof Wall Corium	Coronary region
Extensor tendon	P3	Digital cushion

Word Bank for Interior Hoof

Heel bulb	White line	Abaxial (inner) wall
Abaxial (outer) wall	Sole	



Extra Sources

Vaccinations and how to give a shot:

- More information:

Link: <https://hereford.org/wp-content/uploads/2019/08/0819-HowToInjections.pdf> Link: <https://extension.umn.edu/beef-cow-calf/cattle-vaccine-basics>

Drenching:

- More information:

Link: <https://learn.tearfund.org/en/resources/footsteps/footsteps-31-40/footsteps-34/drenching#:~:text=Drenching%20is%20the%20forced%20pouring%20of%20liquid%20preparations%20down%20the,does%20not%20enter%20the%20lungs.>

Biosecurity:

- More information:

Link: <https://datcp.wi.gov/Documents/BiosecurityDairyFarms.pdf>
Link: <https://www.aphis.usda.gov/animal-health/nahms/dairy/downloads/bamn/BA-MN01-BiosecurityDairies.pdf>
Link: <https://extension.psu.edu/4-h-livestock-biosecurity-tips-fact-sheet>

Diseases:

- More information:

Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>
Link: <https://dairy-cattle.extension.org/dairy-cattle-health-and-diseases/>

Parasites:

- More information:

Link: <https://animal.ifas.ufl.edu/media/animalifasufledu/dairy-website/docs/Cattle-Parasites-Fact-Sheet.pdf>
Link: <https://dairy-cattle.extension.org/internal-parasites-in-beef-and-dairy-cattle/>

Hoof Anatomy:

- More information:

Link: <https://ahdb.org.uk/knowledge-library/the-anatomy-of-a-healthy-cow-s-foot>
Link: <https://www.extension.purdue.edu/extmedia/id/id-321-w.pdf>

- Games:

Link: <https://www.purposegames.com/game/anatomy-of-a-cow-hoof>



Answers

Unit 3: Health and Disease

Activity 3.1

- Modified-Live Vaccine:
 - Non-disease-causing version of the virus or bacteria
 - It helps the immune system develop a full response and create immunity
- Killed Vaccine
 - Contain a dead organism or specific piece of an organism that is critical to the function of the disease-causing virus or bacteria
 - Do not contain a live virus or bacteria
 - Boosters or second vaccinations are needed more often
- Combined Vaccine
 - Contain both modified-live and killed products



Activity 3.2

Medication Insert

Name of Drug _____ **OMNIBIOTIC** _____ *Active Ingredients*
 (Hydrocillin in Aqueous Suspension) _____

For use in Beef Cattle, Lactating and Non-Lactating Dairy _____ *Species and Animal Class*
 Cattle, Swine and Sheep _____

Read Entire Brochure Carefully Before Using This Product

For Intramuscular Use Only

Active Ingredients: Omnibiotic is an effective antimicrobial preparation containing hydrocillin hydrochloride. Each ml of this suspension contains 200,000 units of hydrocillin hydrochloride in an aqueous base.

Approved Uses _____ **Indications:** **Cattle** - bronchitis, foot rot, leptospirosis, mastitis, metritis, pneumonia, wound infections. **Swine** - erysipelas, pneumonia. **Sheep** - foot rot, pneumonia, mastitis; and other infections in these species caused by or associated with hydrocillin-susceptible organisms.

Recommended Daily Dosage
The usual dose is 2 ml per 100 lb of body weight given once daily. Maximum dose is 15 ml/day.

<i>Dosage</i> _____	<i>Body Weight</i>	<i>Dosage</i>
}	100 lb	2 ml
	300 lb	6 ml
	500 lb	10 ml
	750 lb or more	15 ml

Continue treatment for 1 to 2 days after symptoms disappear.

Cautions and Warnings _____ **Caution:** 1. Omnibiotic should be injected deep within the fleshy muscle of the neck or thigh. Do not inject this material in the hip or rump, subcutaneously, into a blood vessel, or near a major nerve because it may cause tissue damage. 2. If improvement does not occur within 48 hours, the diagnosis should be reconsidered and appropriate treatment initiated. 3. Treated animals should be closely observed for at least 30 minutes. Should a reaction occur, discontinue treatment and immediately administer epinephrine and antihistamines. 4. Omnibiotic must be stored between 2° and 8° C (36° to 46° F). Warm to room temperature and shake well before using. Keep refrigerated when not in use.


Sizes Available _____ **Warning:** Milk that has been taken from animals during treatment and for 48 hours (4 milkings) after the last treatment must not be used for food. The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food.

How Supplied: Omnibiotic is available in vials of 100 ml.

Route of Administration _____

Storage Requirements _____

Withholding Times _____


TAKE TIME

OBSERVE LABEL DIRECTIONS



Medication Label

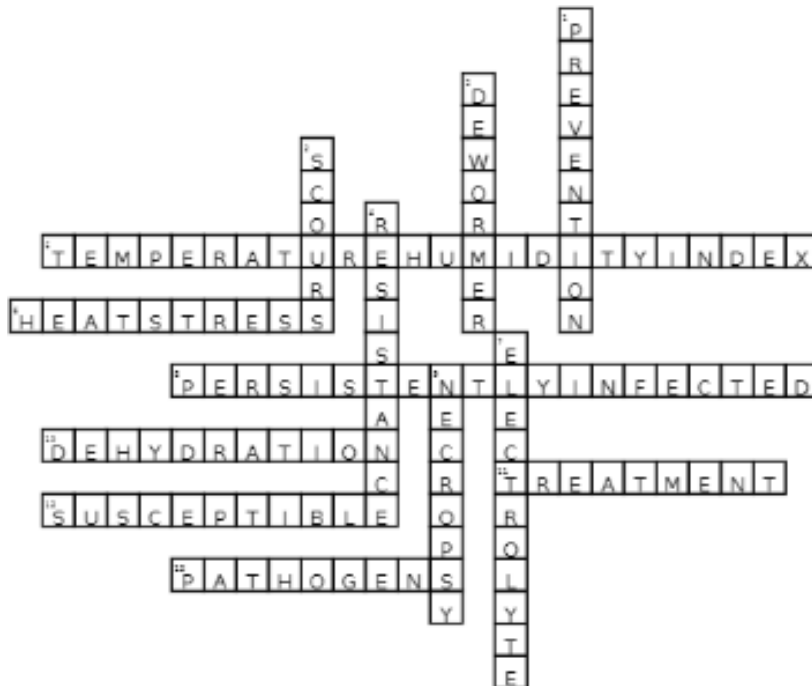
<i>Name of Drug</i>	OMNIBIOTIC		<i>Active Ingredients</i>
	(hydrocillin)		
	Directions for use: See package insert		
<i>Cautions and Warnings</i>	}	Warning: The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food. Exceeding the highest recommended dosage level may result in antibiotic residues in meat or milk beyond the withdrawal time.	<i>Withholding Times</i>
	Store between 2° and 8° C (36° and 46° F)		<i>Storage</i>
	Keep dry and keep away from light		
<i>Quantity of Contents</i>	Net Contents: 100 ml		
	Distributed by		
	USA Animal Health, Inc.		<i>Name of Distributor</i>

TAKE TIME



OBSERVE LABEL DIRECTIONS

Activity 3.3



Activity 3.6

1. Pneumonia
2. Milk fever
3. Metritis
4. Cryptosporidiosis
5. Acidosis
6. Pinkeye
7. Mastitis
8. Bloat
9. Ketosis
10. Coccidiosis
11. Lameness

Joke 1: A cow in an earthquake is called a milkshake.

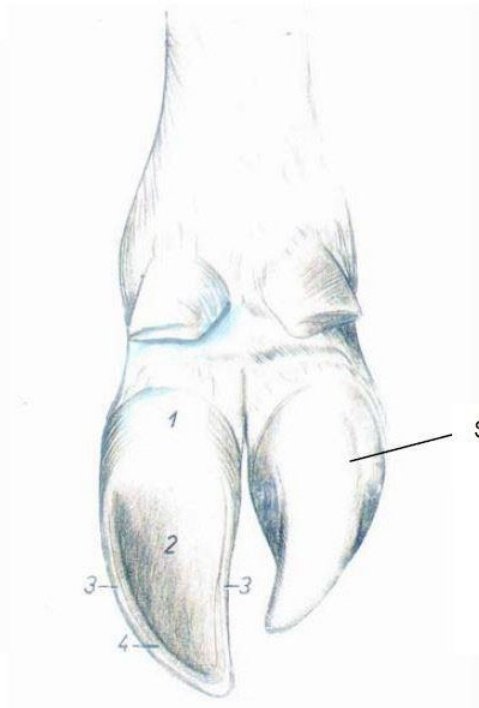
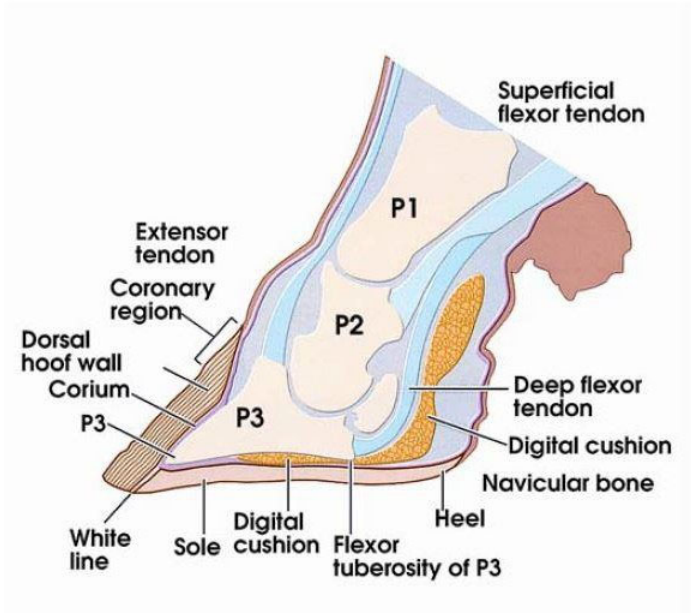
Joke 2: Why do cows have hooves instead of toes? Because they lactose.

Activity 3.7

1. Roundworm -> Small Intestine
2. Lice -> Head and Neck
3. Fly -> All over the Body of a Cow
4. Mite -> Between Skin Layers
5. Tick -> Head and Neck
6. Tapeworm -> Small Intestine



Activity 3.8



Solar corium (claw without horn)

1. Heel bulb
2. Sole
3. Abaxial (outer) wall
4. White line
5. Abaxial (inner) wall



Dairy

Unit 4: Equipment and Records

Project Outcomes Addressed:

- Identify 20 pieces of equipment used for dairy cattle.
- Demonstrate the uses of 20 pieces of dairy cattle equipment.
- Understand how to calculate average daily gain and rolling herd average.
- Understand how to interpret and keep health records.
- Discuss the importance of animal identification for traceability.

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. Equipment Matching
2. Average Daily Gain and Rolling Herd Average
3. Understanding Records
4. Cow Identification

Equipment and Records

Knowing and understanding equipment used on dairy farms and recordkeeping are critical for a successful operation. If you do not know how to use an item or which piece of equipment to use, then how will you run your business? Without records, how can you tell which cow is which? Learn more how both can benefit your dairy in this unit.



Activity 4.1

Equipment Matching

Match the pictures to the definitions and word bank below. Each word and definition will be used only once.

Definitions

1. Used in mastitis detection; milk is placed into each section and a reagent is added that helps identify cases of mastitis
2. Used with semen straws; places semen inside cow during artificial insemination
3. Protects the insemination rod and keeps it clean
4. Measures the vacuum level of milking system
5. Ridged shell surrounding teat cup inflation
6. Controls when vacuum pressure is applied inside the shell
7. Made from flexible materials; attaches to cow's teat milking; normally surrounded by a rigid shell
8. Teat dip fills the top compartment; teat dip is applied to teat by inserting it into top compartment
9. Attaches tags to ear of cattle
10. Collects milk from individual teats, then milk moves through tubing into main pipeline; attaches to shell/inflation and air tubes
11. Used for disbudding calves BEFORE horn emergence
12. Used to give injections to cattle
13. Given to cattle to collect any metal (screws, nails, etc.) that may be eaten and could puncture the rumen (hardware disease)
14. Supports milk/vacuum tubing while the milking unit is attached to the cow
15. Used to castrate bull calf
16. Used to assist cows when having difficulty birthing their calf
17. Maintains vacuum levels in milking system
18. Used for disbudding calves Before or Directly After horn emergence
19. Distributes water/cleaning solution to milking unit during CIP cleaning
20. Used to give injections to cattle

Word Bank

Cow Magnet	Vacuum Gauge	Syringe	Multiuse Syringe	Inflations
Teat Cup Shell	Jetter Distributor	Teat Dip Cup	Pulsator	Elastrator
Vacuum Regulator	CMT Paddle	Support Arm	Milking Claw	OB Chain
Insemination Tubes	Electric Dehorner	Insemination Rod	Caustic Paste	Ear Tagger



Match the corresponding equipment to its picture.



















Activity 4.2

Average Daily Gain and Rolling Herd Average

Average Daily Gain (ADG) can be defined as the average amount of weight a market animal will gain each day during the feeding period.

ADG can be calculated by taking the amount of weight an animal has gained since the last weight and dividing the weight by the number of days since the last weight.

$$\text{Weight gain during the preweaning period} = \frac{\text{weaning weight} - \text{birth weight}}{\text{age (in days) at weaning}}$$

For this activity complete the scenario calculation below:

This activity will have you calculate your own average dairy gain. Take your own weight (or a pet's) on day 1. This can be any day of the week. In seven days, re-weight yourself or your pet. Subtract your day 7 weight from your day 1 weight and then divide it by 7 (number of days in between weight ins) to calculate your ADG.

Answer:



Rolling Herd Average represents how much milk, milk fat, or milk protein were produced by the average cow in a herd for the previous year.

For this activity complete the scenario calculations using the table below:

This activity will have you calculate rolling herd average for milk fat on a 5-cow dairy for one year. Find the average for each cow and month and fill in the blank space in the table. Use the averages to find the rolling herd average of milk fat for one year.

	Cow 1004			Cow 2247			Cow 3979			Cow 4832			Cow 5678		
	MF	PR	MP	MF	PR	MP	MF	PR	MP	MF	PR	MP	MF	PR	MP
January	3.6	24,000	3.1	3.2	25,000	3.2	4.0	24,300	3.2	3.4	21,000	3.0	3.8	24,000	3.4
February	3.8	24,100	3.2	3.1	25,100	3.3	3.8	24,200	3.2	3.6	21,100	3.2	3.7	24,200	3.5
March	4.0	24,000	3.2	3.4	25,000	3.3	4.0	24,200	3.1	3.8	21,200	3.3	3.8	24,100	3.2
April	3.6	24,100	3.1	3.1	25,000	3.4	4.0	24,200	3.0	3.6	21,300	3.1	3.8	24,200	3.1
May	3.2	23,900	3.0	3.2	24,900	3.4	4.3	24,200	3.1	3.4	21,100	3.1	3.8	24,200	3.2
June	2.8	23,900	3.2	3.0	24,800	3.2	4.2	24,200	3.2	3.2	21,200	3.2	3.7	24,500	3.2
July	3.6	23,800	3.2	2.8	24,700	3.1	4.3	24,100	3.3	2.8	21,000	3.0	3.9	24,600	3.3
August	3.6	23,900	3.1	3.3	24,700	3.0	4.2	24,100	3.2	3.0	20,000	3.2	3.8	24,700	3.3
September	3.8	24,000	3.0	2.6	24,600	3.1	4.0	24,100	3.0	3.2	21,000	3.3	3.7	24,600	3.4
October	4.0	23,900	2.9	2.8	24,500	3.1	3.9	24,100	2.9	3.4	21,100	3.1	3.9	24,500	3.4
November	3.7	23,900	3.0	3.0	24,400	3.1	4.0	24,200	2.7	3.6	21,200	3.1	4.0	24,500	3.5
December	3.5	23,800	2.9	3.2	24,400	3.1	4.2	24,300	3.1	3.8	21,200	3.2	3.8	24,500	3.4

Fill in the averages for each month for milk fat% (MF), milk production (PR), and milk protein% (MP) and calculate the total averages for each of the three.

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Total:
MF													
PR													
MP													



Activity 4.3 Understanding Records

Fill in the blanks regarding the DHIA Report below. Each term is only used once from the word bank.

130 - Cow Page DHI-203

86753099
John Doe's Dairy Farm

Date of Test 01/30/2023

DRMS PCDART
Printed 4/18/2023 2:42:13 PM

Barn Name 2186M Index No. 2201

Cow	Index No.	2201	Breed	HO	DHI ID	70192740	PTA Milk	+239
	Barn Name	2186M			Name or number	7HO11752	PTA % Fat	+53
	DHI ID	84000000000000			PTA Prot		+43	
	Farm ID				PTA \$		+473	
Date of Birth	02/07/2017			Breed	HO	Ret.		
PTA Milk	+248	PTA \$	+104		DHI ID		PTA Milk	+0
PTA % Fat		Rel.			Name or number		PTA % Fat	+0
PTA Fat	+15	Pctile(NM)			PTA Prot		PTA Prot	+0
PTA Prot	+19				PTA \$		PTA \$	+0
					Breed		Ret.	
							Pctile(NM)	

Lactation Production Summary

Calving Date	Age at Calving Yr - Mo	Days Dry Before Calving	C	Days 3X	305 Day Lactation					Complete Lactation				Type of record		
					Cond. Aff. Record	Milk	% Fat	Fat	% Prot	Prot	Days in Milk	Milk	Fat		Prot	Value Product
04/19/2020	3 - 2	0	C	0	0						302	23999	1015	727		DHI-APCS
04/13/2021	4 - 2	57	C	0	24974	3.9	966	3.2	804	356	27933	1085	906		DHI-APCS	
06/03/2022	5 - 3	60	A	0						242	26355	1003	791		DHI-APCS	

Status Change	Last Test			Lifetime Production			Milk per Day Since 24 Mos	Vital Deviation			Estimated Relative Producing Ability				
	Milk	% Fat	% Prot	Milk	Fat	Protein		Milk	Fat	Protein	Milk	Fat	Protein		
Calved															
06/03/2022	107.7	4.6	3.3	78287	3103	2424	54	+115	+36	+31	+272	+53	+54		

Calf and Breeding Record

Calving Date	Body Wt (CWT)	Days Open	# B r	Successful Breeding Date	Sire		Calf		Persist. of Lact Curve	Avg. SCCS for Lact	ME Lactation			Herdmate Deviation		
					Identity	B r	Sex	Identity			Milk	Fat	Prot	Milk	Fat	Prot
04/19/2020	13	81					M	737	114	1.5	26588	1124	788	-1634	+37	-16
04/13/2021	13	135	1	7/09/2020	614HO14583		F	05231	103	2.7	25723	995	822	-1847	-32	+45
06/03/2022	13	153	3	8/26/2021	7AN437		F	05363	123	0.5	33925	1328	1035	+4567	+206	+187
			2	11/03/2022	507HO12788	HO	Due	08/10/2023								

Test Day Data

Lact No.	Calving Date	1st Test Day		2nd Test Day		3rd Test Day		4th Test Day		5th Test Day		6th Test Day		7th Test Day		8th Test Day		9th Test Day		10th Test Day		11th Test Day	
		SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot
2	04/19/2020	7	4.1	1	2.8	0	2.6	0	2.9	1	2.9	1	3.1	2	3.1	0	3.1	0	3.3	2	3.4		
3	04/13/2021	19	4.1	62	3.5	98	3.7	104	3.7	87	4.0	75	4.2	88	3.6	70	4.3	68	4.0	65	3.8	61	4.0
4	06/03/2022	1	2.7	0	2.6	0	2.6	2	2.9	0	3.2	1	3.5	0	3.4	0	3.4	0	3.3				
		104	3.5	124	3.0	105	3.1	116	4.0	110	4.3	110	4.5	100	3.9	108	4.6						



Word Bank for DHIA Report

Days in Milk Weight Fat content % Protein content %	Days Open (days since calved to bred) # Br - breedings per pregnancy	Average Somatic Cell Score for Lactation	Somatic Cell Score Milk Weight % Protein %Fat For previous test days	Yield and production compared to herd mates
--	--	--	---	--



Activity 4.4

Cow Identification

Name three methods of cow identification. Use the link below to help:

Link: <https://www.extension.purdue.edu/extmedia/as/as-556-w.pdf>

1. _____ 2. _____ 3. _____

Why is cow identification important?



Extra Sources

Equipment:

- More information:
Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

Average Daily Gain and Rolling Herd Average:

- More information:
Link: <https://animalrangeextension.montana.edu/beef/articles/dailygain.html>
Link: https://cdn.agclassroom.org/ok/lessons/upper/ag_algebra_average.pdf

Understanding Records:

- More information:
Link:
[https://www.canr.msu.edu/uploads/234/40263/Dairy Notebook 2017 Intermed 12-14.pdf](https://www.canr.msu.edu/uploads/234/40263/Dairy_Notebook_2017_Intermed_12-14.pdf)
Link: <https://extension.tennessee.edu/publications/Documents/W969.pdf>

Cow Identification:

- More Information:
Link: <https://extension.missouri.edu/news/proper-cattle-identification-systems-4492#:~:text=Identification%20is%20important%20in%20tracking,health%20status%20of%20the%20cattle.>



Answer Key

Unit 4: Equipment and Records

Activity 4.1

Answers found here: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

Activity 4.2

ADG: example

day one weight 120

day seven weight 122

$$122 - 120 / 7 = 0.29$$

RHA:

	Jan	Feb	March	April	May	June
MF	3.6	3.6	3.8	3.62	3.58	3.38
PR	23,660	23,740	23,700	23,760	23,660	23,720
MP	3.18	3.28	3.22	3.14	3.22	3.2

July	Aug	Sep	Oct	Nov	Dec	Total:
3.48	3.58	3.46	3.6	3.66	3.7	3.59
23,640	23,480	23,660	23,620	23,640	23,640	23,660
3.18	3.16	3.16	3.08	3.08	3.14	2.91



Activity 4.3

130 - Cow Page DHI-203

Barn Name: 4657 Index No: 4657

63100001

Date of Test 09/11/2018

DRMS PCDART

Printed 10/12/2018 1:05:56 PM

Cow		Sire		Dam	
Index No.	Barn Name	DHI ID	Name or number	DHI ID	Name or number
4657	4657	62072808	PTA Milk +332	3011731900	PTA Milk +0
HO	HO	PTA Fat +38	PTA Fat +0	4484	PTA Fat +0
DHI ID 840003128910481		PTA Prot +5	PTA Prot +0		PTA Prot +0
Farm ID		PTA \$ +191	PTA \$ +0		PTA \$ +0
		Rel	Rel		Rel
		Protein(M)	Protein(M)		Rel
					Rel

Date of Birth 08/10/2015

PTA Milk +396 PTA \$ +214

PTA Fat +23 Rel

PTA Prot +7 Protein(M)

Lactation Production Summary

Calving Date	Age at Calving W-M	Days Dry Before Calving	Days 30	305 Day Lactation				Complete Lactation				Type of Record
				Milk	% Fat	% Prot	Protein	Milk	% Fat	% Prot	Protein	
11/01/2017	2-2	0	8					285	22046	998	658	DHI-APCS

Status Change

Status Change	Last Test				L/Normal Production				Milk per Day Since 30 Days of Age				Yield Deviation				Estimated Relative Producing Ability			
	Milk	% Fat	% Prot	Protein	Milk	% Fat	% Prot	Protein	Milk	% Fat	% Prot	Protein	Milk	% Fat	% Prot	Protein				
Dry 08/13/2018					22046	998	658	55	+583	+55	+23	+415	+33	+33	+33	+33				

Call and Breeding Record

Calving Date	Bred W-M	Days Open	# Br	Successful Breeding Date	Sire		Sex	Age	Identity	Purcell of Last Calf	Avg SCCS for Last	MI Lactation			Herdmate Deviation		
					MI	Fat						Prot	MI	Fat	Prot		
11/01/2017	12	64	1	21/02/2017	7HD11189	M	507	109	1.9	28477	1266	841	+638	+71	+67		
				21/04/2018	7HD11314	HO	Dub	10/11/2018									

Test Day Data

Last No.	Calving Date	1st Test Day		2nd Test Day		3rd Test Day		4th Test Day		5th Test Day		6th Test Day		7th Test Day		8th Test Day		9th Test Day		10th Test		11th Test	
		SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot	SCCS	%Prot
1	11/01/2017	34	4.5	69	4.6	85	5.4	84	4.3	86	4.4	86	4.6	85	4.4	80	4.2	89	4.8				

Days in Milk
Milk Weight
Fat content %
Protein content %

Yield and production compared to herdmates

Days Open (days since calved to bred)
Br – breedings per pregnancy

Average Somatic Cell Score for Lactation

Somatic Cell Score
Milk Weight
% Protein
% Fat
For previous test days

Activity 4.4

1. Branding
 2. Tattoo
 3. Ear tag
- *any order

Why?

Identification is important in tracking cattle performance. It is used to make management decisions that will improve productivity of the cattle operation. Identification also helps in tracking health and treatment of those issues that will lead to optimum health status of the cattle. Identification can also be important in the ownership and sale of cattle.



Dairy

Unit 5: Nutrition and Feeding

Project Outcomes Addressed:

- Understand the function of each part of a ruminant stomach and label the digestive tract of a dairy cow
- Identify and distinguish among the following forages and feedstuffs: soybean meal, whole soybeans, trace mineral salt, whole grain wheat, alfalfa, dried whey, fish meal, whole kernel corn, cracked corn, corn silage and haylage
- Describe the importance of colostrum for calf health
- Describe the following nutrients or nutrient analyses: carbohydrates, fat, fiber, nonprotein nitrogen, nonstarch polysaccharides, relative feed value, relative forage quality, starch, total digestible nutrients, net energy for lactation, and water-soluble or nonfibrous carbohydrates
- Describe the following processes: creating a total mixed ration, top dressing, bottle feeding, rotational grazing and weaning
- Identify the amount of grain a calf should be consuming at weaning
- Describe the ideal weaning weight and height for a given dairy breed
- Analyze a feed tag to determine if it contains a medication
- Analyze a feed tag to determine the relative proportions of individual feed ingredients that make up the feed

You will need:

- Pencil
- Access to the internet

Activities in this unit:

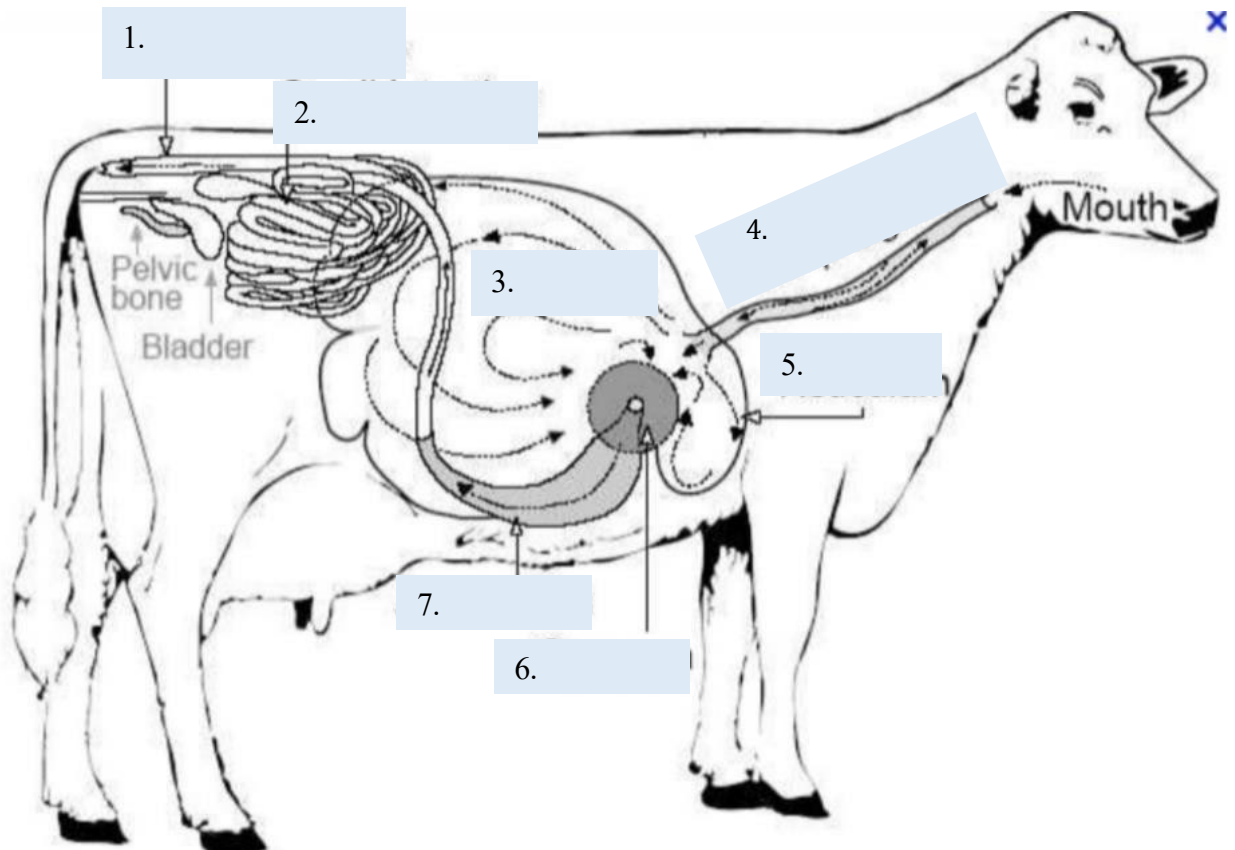
1. Label the Digestion Tract
2. Nutrition Wordsearch
3. Understanding Colostrum
4. Nutrition Crossword
5. Nutrition Scramble
6. What's for Dinner?



Activity 5.1

Label the Digestive Tract

Use the link for help: [The ruminant digestive system \(umn.edu\)](http://The.ruminant.digestive.system(umn.edu))



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____



Label the parts of the ruminant stomach. Use the link to help:

extension.msstate.edu/publications/understanding-the-ruminant-animal-digestive-system

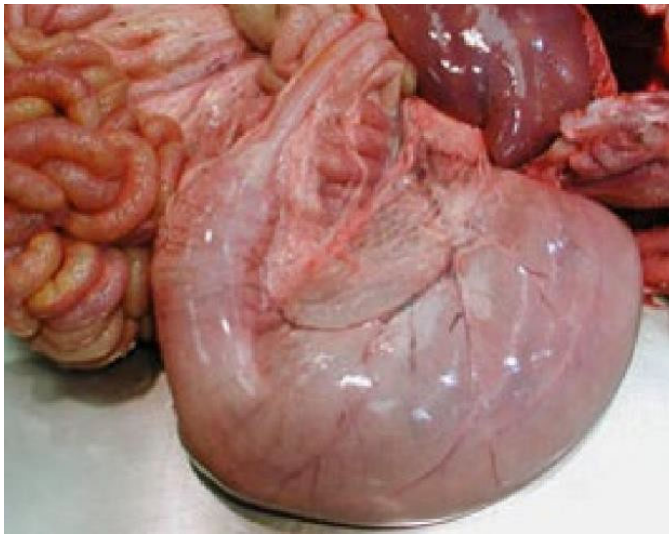
1.



2.



3.



4.



1. _____

3. _____

2. _____

4. _____



Activity 5.2

Nutrition Word Search

Look at the pictures on the next page and find the nutrition words in the word search. Use the link for help:

Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

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





Activity 5.3

Understanding Colostrum

Colostrum instruments

Colostrometer

- Measures specific gravity
- Placed in a cylinder containing colostrum and floats freely
- **Green**= >50 mg/mL of immunoglobulins
- **Yellow**= 20 to 50 mg/mL of immunoglobulins
- **Red**= <20 mg/mL of immunoglobulins

Refractometer

- Few drops of colostrum placed on prism and sample covered
- lowered
- Hold up to light source
- Value is read at the line between the light and dark areas that appear on the scale

• Colostrometer



• Refractometer



A BRIX value of 22% is the best quality of colostrum

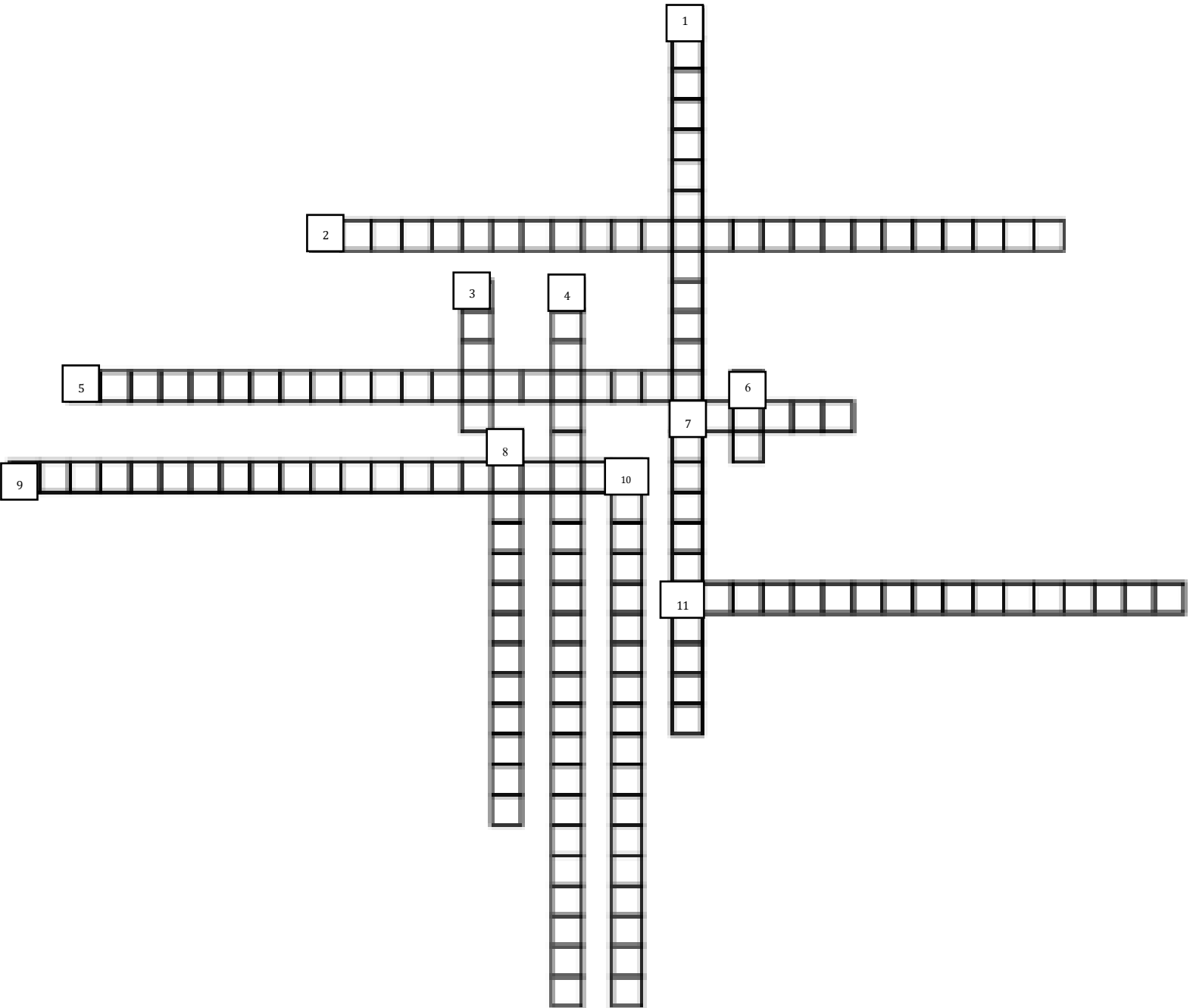
Watch the how to videos below:

- Colostrometer:
https://www.youtube.com/watch?v=bL59AxJP_fA
- Refractometer:
<https://www.youtube.com/watch?v=uMZ5hsl6qws>



Activity 5.4

Nutrition Crossword



Word Bank for Crossword

carbohydrates	fat	fiber	nonprotein nitrogen	nonstarch polysaccharides
relative feed value	relative forage quality	starch	total digestible nutrients	net energy for lactation
water-soluble carbohydrates				

Down:

1. Carbohydrate fractions excluding starch and free sugars
3. Type of carbohydrates that the body cannot digest
4. An estimate of energy content of a feed and is based on the digestible portion of the nutrients that can supply energy, carbohydrates, protein, and fat
6. Comprises that most energy dense nutrient with 2.25 times as energy than carbohydrates or protein
8. nutrient based on carbon, hydrogen, and oxygen
10. Refers to components such as urea that are not proteins but can be converted to proteins by microbes in the ruminant stomach

Across:

2. The non-cell wall fraction consists of the highly digestible cell contents (starch and sugars)
5. An estimate of how much availability energy a non-lactating animal will obtain daily from a particular forage if it is all that is fed
7. A polymeric carbohydrate consisting of numerous glucose units joined by glycosidic bonds
9. The amount of energy in a feed which is available for milk production and body maintenance
11. Index used to compared the quality of forages relative to the feed value of full bloom alfalfa



Activity 5.5

Nutrition Scramble

Using the definitions below, unscramble to words and match them to the definition.

1. TLATO XMEID NRIOAT _____
2. POT ENIDGRSS _____
3. LOTBTE GEIDNEF _____
4. OTLNIRATAO IAZNGRG _____
5. NWENGAI _____

1. Definition: That contains all the feeds and nutrients the cow needs are an effective, efficient and profitable way to feed dairy cows

Activity Link: <https://agunited.org/files/4614/4650/2070/TMR.pdf>

2. Definition: Adding needed nutrients that might be lacking in the overall TMR

Example Link:

<https://www.admanimalnutrition.com/webcenter/portal/ADMAnimalNutrition/pages/feed/showfeeds/showdairy/top-dresses>

3. Definition: The action of feeding a calf with milk from a bottle

How to: <http://extension.msstate.edu/publications/publications/caring-for-newborn-beef-calves-separated-their-dams>

4. Definition: The practice of containing and moving animals through pasture to improve soil, plant, and animal health

How to: <https://rodaleinstitute.org/why-organic/organic-farming-practices/rotational-grazing/>

5. Definition: The removal of a suckling calf from the cow

How to: <https://extension.psu.edu/the-delicate-art-of-weaning-calves>



Activity 5.6

What's for Dinner?

Using the information below and the picture on the next page, complete the activity.

Activity: <https://aec.ifas.ufl.edu/media/aecifasufledu/teacher-repository/Feed-Label-Activity-Sheet.docx>

The following are key components of a cattle feed tag:

- **Product Name:** An obvious but important piece of information. If a product is medicated, the word “medicated” will follow the product name.
- **Brand Name:** The brand of the product is listed.
- **Purpose Statement:** Information about the species and animal class the feed is indicated for. It's critical to check that your feed has been specifically formulated for your class of cattle. For example, you would not want to feed a product designed for “mature cows at maintenance” to “young, growing heifers.”
- **Medicated Use Statement:** If the cattle feed is approved for use with an active ingredient, the Environmental Protection Agency or Food and Drug Administration indication for use statement will be included. If a Veterinary Feed Directive-regulated ingredient is used, a VFD statement will also be listed.
- **Active Ingredient(s):** Lists any active ingredients in the cattle feed and their associated level.
- **Guaranteed Analysis:** Lists required nutrients, dependent upon the intended use of the feed and species/animal class. It also lists the nutrient level the government regulates. Any nutrient guaranteed on the tag is potentially subject to testing by regulatory agencies to determine whether the tag guarantees are accurate.
- **Feed Ingredients:** Lists ingredients in the product beyond what's listed in the guaranteed analysis section. Feed ingredients will tell you the source of an ingredient. For example, “calcium” is listed under the guaranteed analysis, but you can see that “calcium carbonate” is its source.
- **Manufacturer/Distributor Information:** The name appearing on the label is responsible for the cattle feed product and regulatory compliance. Typically, a mailing address will be included. Distributors use a statement “manufactured for” or “distributed by” to differentiate themselves from manufacturers.
- **Net Weight/Quantity:** Weight and quantity of cattle feed, as packaged.
- **Directions for Use:** Explains the safe and effective use of the cattle feed.
- **Feeding and Management Instructions:** A detailed listing of how the product should be fed and how many animals it will feed. Manufacturers formulate cattle feeds to be fed at a specific range of feeding rates. When a product is not fed according to directions, the full nutritional benefits of the feed may not be realized, and the feed may not perform as intended. The instructions should also outline other management factors to help ensure optimal product use.
- **Storage and Disposal:** Instructions for storage, disposal and container handling.
- **Precautionary Statements and Warnings:** Describes potential hazards for humans and domestic animals.



Anatomy of a feed tag

PURINA® WIND & RAIN AS 4 MINERAL TUB ALTSID®

SUPPLEMENT FEED FOR BEEF CATTLE ON PASTURE
Prevents Adult Horn Fly Emergence From Manure Of Treated Cattle

Medicated Use Statement: A mineral and vitamin supplement for beef calves and cattle containing S-Methoprene® Insect Growth Regulator for continuous feeding to beef cattle through the horn fly season. *As the Insect Growth Regulator Altsid®

Active Ingredient(s): S-Methoprene (CAS #65733-16-6) 0.007%
Other Ingredients 99.993%
Total 100.000%

Feed ingredients: Beet Molasses, Dicalcium Phosphate, Monocalcium Phosphate, Calcium Carbonate, Potassium Chloride, Soybean Oil, Magnesium Oxide, Sodium Hydroxide, Dehulled Sunflower Meal, Sodium Selenite, Vitamin E Supplement, Vitamin A Supplement, Cobalt Carbonate, Vitamin D3 Supplement, Manganese Sulfate, Ethylenediamine Dihydrochloride, Zinc Sulfate, Ethoxyquin (a Preservative), Basic Copper Chloride.

Manufacturer/Distributor Information: EPA Reg. No. 80459-90-602
EPA Est. No. 602-NE-001
Manufactured By: Purina Animal Nutrition LLC
1980 County Road F West
Shoreview, MN 55125-2910
Feed Questions? Please Call 1-800-227-8941

Net Weight/Quantity: NET WT. 225 lb (102.05 kg)

PURINA

DIRECTIONS FOR USE: It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. GENERAL INFORMATION: This product is to be used as a cattle feed-through pesticide for the control of horn flies. All feed ingredients listed on this product label must adhere to the specifications and limits (if applicable) specified by the Food and Drug Administration (FDA) for the use of pesticides in cattle feed. This product contains ethoxyquin, a preservative. The amount of ethoxyquin may vary according to the individual manufacturer's formulation and will not exceed the 150 ppm maximum limit established for ethoxyquin by FDA, per 21 CFR 573.300. FEEDING AND MANAGEMENT INSTRUCTIONS: Feed this product to cattle only. When used as directed, this tub will provide sufficient (S)-methoprene insect growth regulator to prevent the emergence of adult horn flies from manure of treated cattle. Existing adult horn flies will not be affected. Start feeding before horn flies appear and continue use until cold weather marks the end of the horn fly season. Allow free choice to cattle. Cattle should consume 34 mg of (S)-Methoprene per 100 lbs of cattle body weight per month to achieve horn fly control. This is equivalent to an average of 0.571 ounces (0.0357 pounds) of this tub per 100 lbs. of cattle body weight per day, which is equivalent to 8 ounces (0.5 pounds) per day for a 1,400 pound cow. To feed this tub: Remove the protective sheet and score several times with a knife to encourage initial consumption.

Feeding and Management instructions:

1. Assure cattle are not starved for nutrients prior to feeding PURINAB WIND & RAIN AS 4 MINERAL TUB ALTSID®.
2. This product contains added copper. Do not feed to cattle in close proximity to sheep or other species that have a low tolerance to supplemental copper.
3. Offer cattle 1 tub for every 15 to 25 head of cattle.
4. Remove all other self-feeding nutritional supplements when cattle are consuming this product.
5. Locate tubs where cattle congregate (watering, loafing, shade areas).
6. Replenish tubs on a regular basis as needed.
7. If intake of this tub is below 0.571 ounces per 100 lb cattle body weight per day, increase the number of feeding locations and/or change location(s) to areas more frequented by cattle.
8. If intake of this tub is above 0.571 ounces per 100 lb cattle body weight per day, reduce the number of feeding locations and/or change location(s) to areas less frequented by cattle.
9. Introduction of this product after adult horn fly infestation is established will require treatment of cattle with antibiotics if elimination of the adult fly population is desired.

STORAGE AND DISPOSAL: Do not contaminate water, food or feed by storage and disposal. STORAGE: Store in a cool, dry place. Do not stack anything on top of this tub without placing a slip sheet or wooden pallet between tubs. PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on-site at an approved waste disposal facility. CONTAINER HANDLING: Reusable container. Do not reuse or refill this container. Offer for recycling if available, or puncture and dispose of in a sanitary landfill or by other procedures approved by state and local authorities.

PRECAUTIONARY STATEMENTS:

HAZARDS TO HUMANS AND DOMESTIC ANIMALS: WARNING: Causes substantial but temporary eye injury. Do not get in eyes or on clothing. Wear protective eyewear (goggles, face shield, or safety glasses). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

FIRST AID: If in eyes:

1. Hold eye open and rinse slowly and gently with water for 15-20 minutes.
2. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
3. Call a poison control center or doctor for treatment advice. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact the National Poison Control Center at 1-800-222-1222, 24 hrs/day, 7 days/week for emergency medical treatment information.

ENVIRONMENTAL HAZARDS: Do not apply directly to water, or to areas where surface water is present or to riparian areas below the mean high water mark. This product contains supplemental selenium. Selenium can be fed at levels up to 120 ppm in a mixture for free-choice feeding at a rate not to exceed an intake of 3 mg per head per day. ALTSID® Insect Growth Regulator is a registered trademark of Wellmark International. This feed was made in a feed manufacturing facility that does not handle or store products containing animal proteins prohibited in ruminant feed.



Extra Sources

Digestive Tract:

- More information:
 - Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>
 - Link: <https://extension.umn.edu/dairy-nutrition/ruminant-digestive-system>
 - Link: <https://extension.purdue.edu/news/county/crawford/2020/11/docs/The-Digestive-Tract-of-the-Cow.pdf>
- Games:
 - Link: <https://www.purposegames.com/game/digestive-system-cow-game>
 - Link: <https://www.purposegames.com/game/dairy-cow-digestive-system>

Feed Stuff:

- More Information:
 - Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>
 - Link: <https://www.purinamills.com/horse-feed/education/detail/horses-don-t-eat-feed-tags>

Colostrum:

- More information:
 - Link: https://www.extension.iastate.edu/dairyteam/files/page/files/FINAL_Newborn%20calves%20%26%20Colostrum%20management.pdf
 - Link: <https://extension.tennessee.edu/publications/Documents/W660-B.pdf>

Weaning:

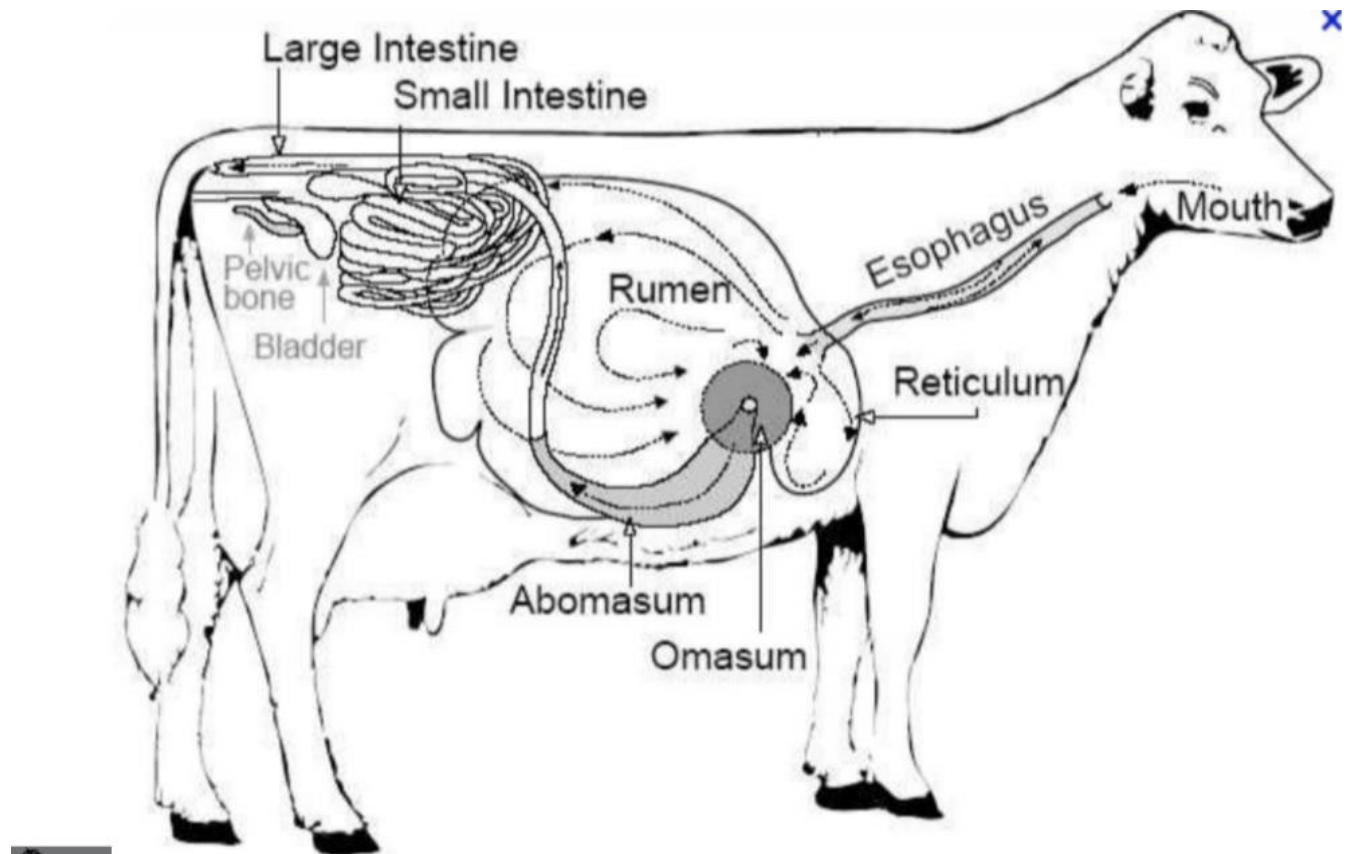
- More information:
 - Link: <https://extension.psu.edu/early-weaning-strategies>



Answer Key

Unit 5: Nutrition and Feeding

Activity 5.1



1. Rumen
2. Reticulum
3. Omasum
4. Abomasum



Activity 5.2



trace mineral salt	whole grain wheat	
whole kernel corn	whole soybeans	soybean meal
cracked corn	corn silage	dried whey
fish meal	alfalfa	haylage.

Answers for pictures can be found here:

Link -

<https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>





Soybean meal



Cracked corn



Dried Whey



Whole kernel corn



Corn silage



Fish meal



Alfalfa



Whole soybeans



Trace mineral salt

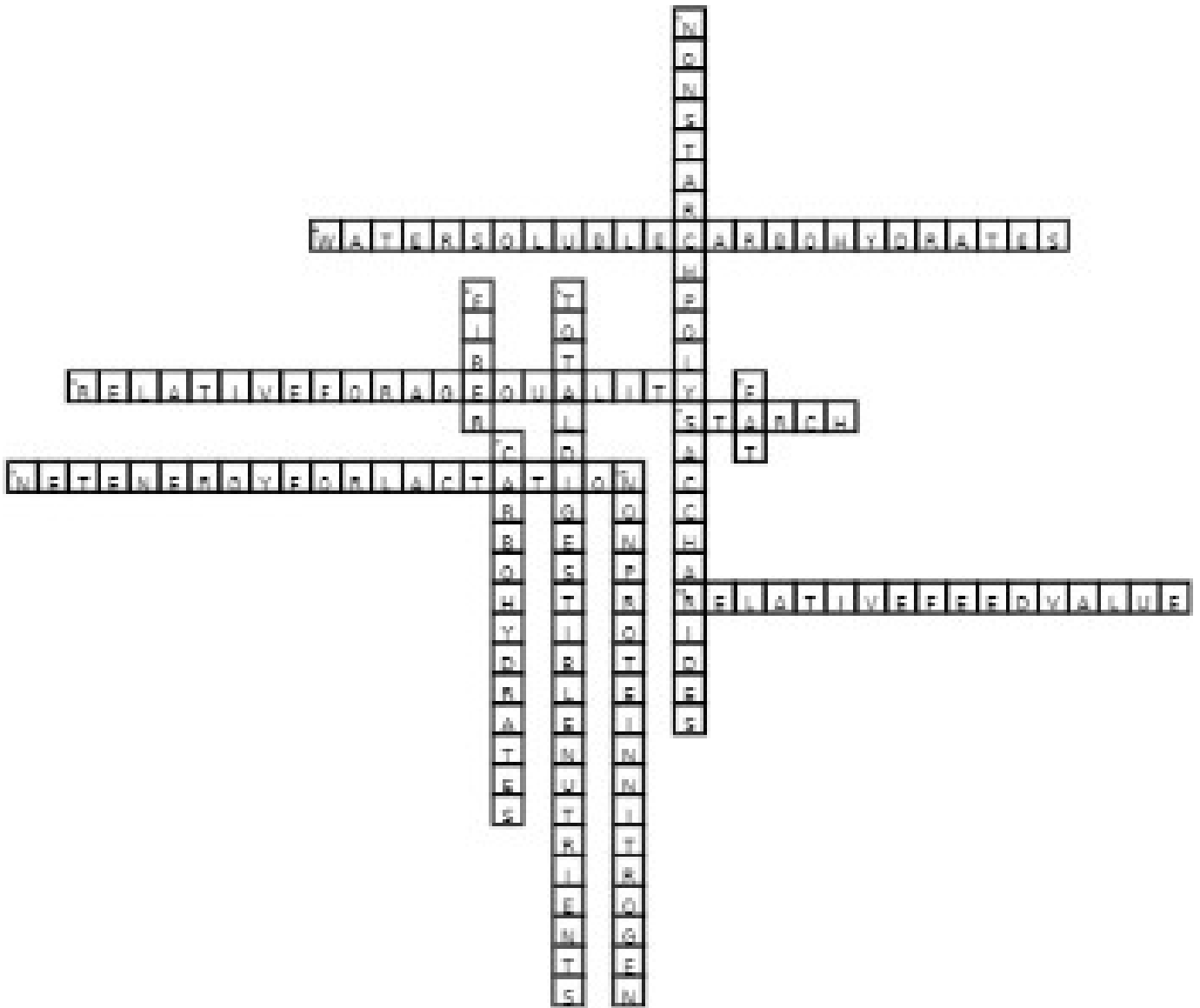


Whole grain wheat



Haylage

Activity 5.4



Activity 5.5

TLATO XMEID NRIOAT
 POT ENIDGRSS
 LOTBTE GEIDNEF
 OTLNIRATAO IAZNGRG
 NWENGAI

TOTAL MIXED RATION
TOP DRESSING
BOTTLE FEEDING
ROTATIONAL GRAZING
WEANING



Dairy

Unit 6: Genetics and Reproduction

Project Outcomes Addressed:

- Define the following terms: genomics, anestrus, dystocia, estrus, estrous cycle, gestation, anestrous, prepartum and postpartum.
- Label the reproductive tract of both a male and female dairy cow.
- Describe the concept of a freemartin and explain why it occurs.
- Outline the basic processes and benefits of estrus synchronization, artificial insemination, embryo transfer and in vitro fertilization.
- Identify three sampling techniques for genomic testing.
- Read and interpret a sire summary.

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. Genetic Scramble
2. Label the Reproduction Tract
3. Reproduction Rescue
4. Guessing Genomics

Genetics and Reproduction Overview

Reproduction is a fundamental feature of all living organisms. It is a biological process through which living organisms produce offspring similar to them. Improvement of dairy herd **genetics** can affect herd health, longevity, reproductive traits and many other vital aspects of dairy cattle production.



Activity 6.1

Genetic Scramble

Using the definitions below, unscramble to words and match them to the definition.

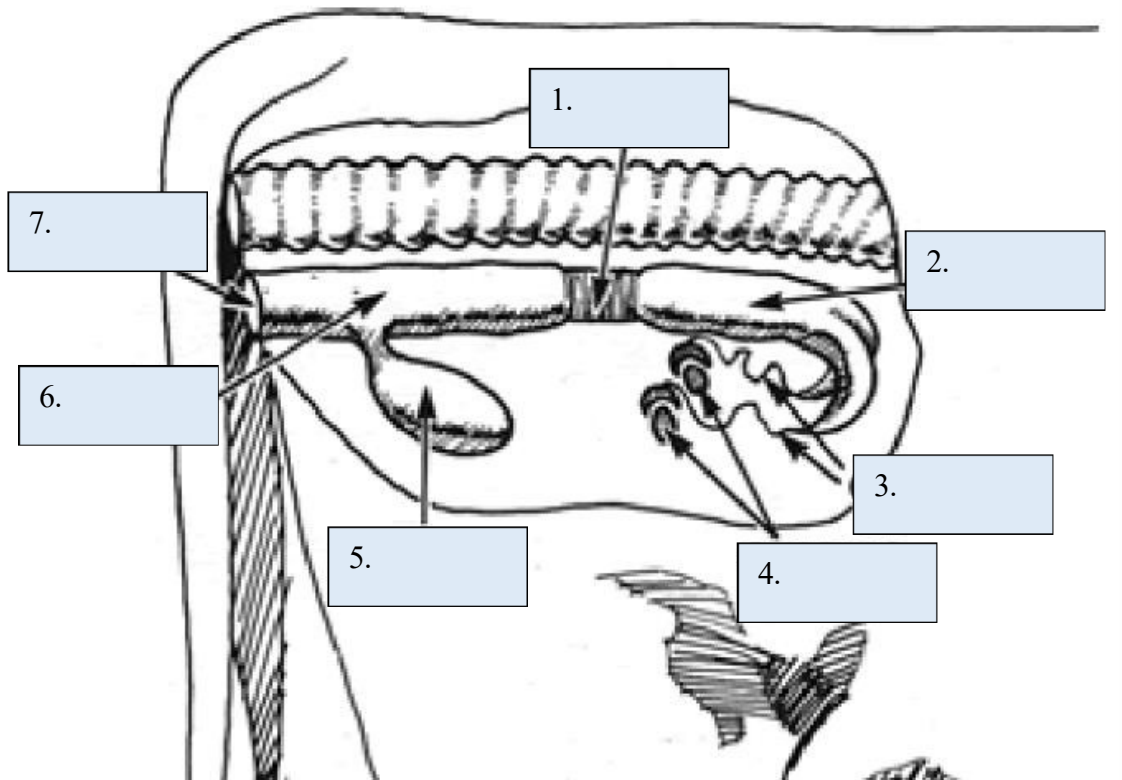
- | | | |
|----|---------------|-------|
| 1. | MPSPORUTAT | _____ |
| 2. | NRSESATU | _____ |
| 3. | ASDIOYCT | _____ |
| 4. | OTESTGAIN | _____ |
| 5. | OESTRSU LCECY | _____ |
| 6. | GIENCMSO | _____ |
| 7. | SRUETS | _____ |
| 8. | APUEMPRTR | _____ |

1. Following calving or the time after the birth of young calves
2. Showing no heat activity because the process of follicle development does not lead to ovulation
3. Difficult birth
4. The process or period of developing inside the womb between conception and birth
5. The recurring reproductive cycle in many female mammals, including estrus, ovulation and changes in the uterine lining.
6. The branch of molecular biology concerned with the structure, function, evolution and mapping of genomes
7. A recurring period of sexual receptivity and fertility in many female mammals; heat.
8. Before giving birth; prenatal



Activity 6.2

Female



Label the Reproductive Tract

1. _____

4. _____

7. _____

2. _____

5. _____

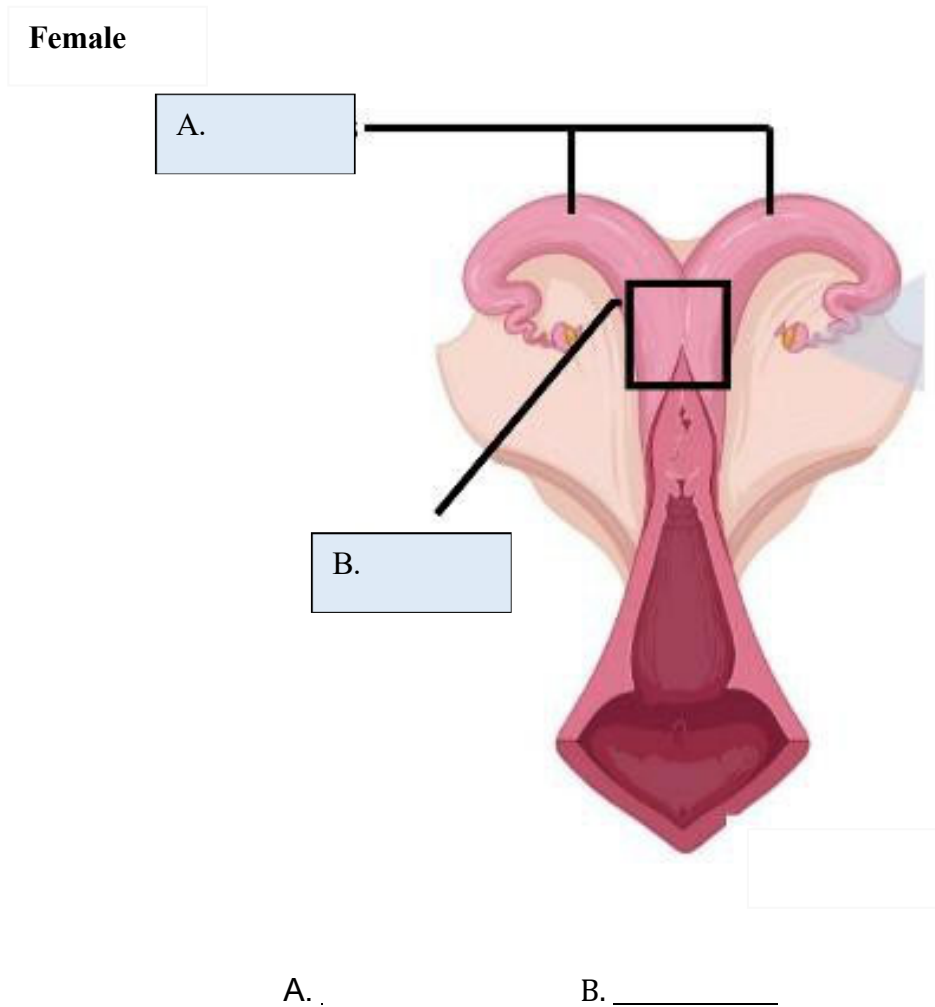
3. _____

6. _____

Vulva: External opening to vagina and breeding begins here

Vagina: Sperm is deposited here in natural breeding

Cervix: Guardian of the uterus; thick-walled structure with annular rings and is the resting area for sperm traveling to uterus.



Uterus: Two parts

Uterine body: semen deposited in artificial breeding

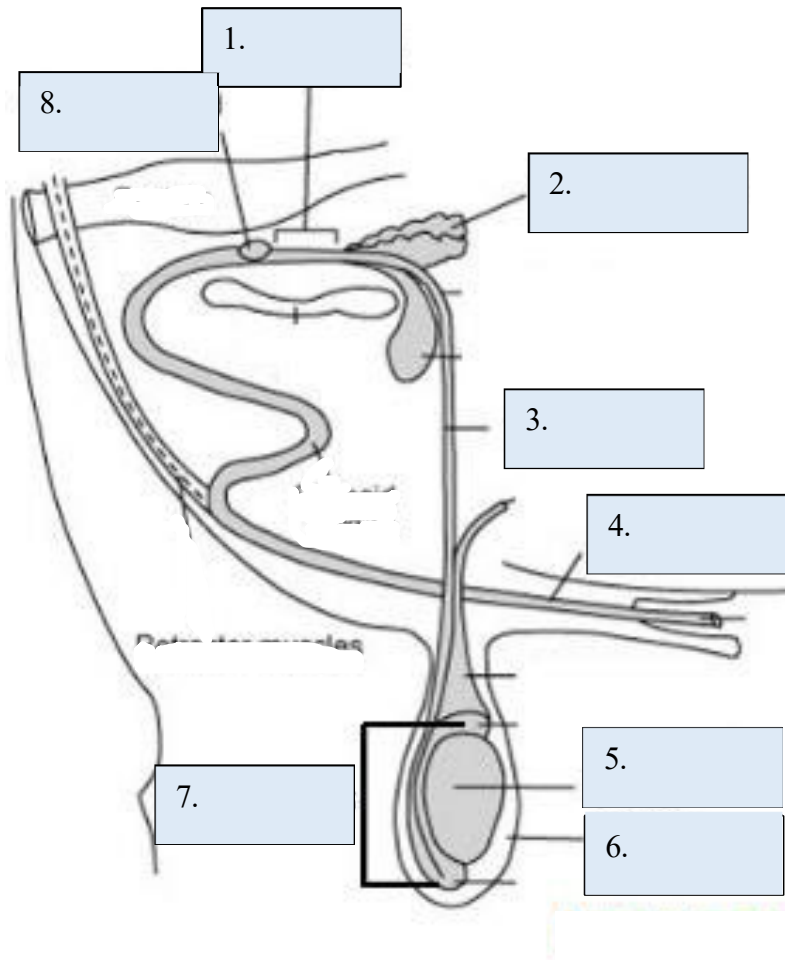
Uterine horns: Calf will develop in one of the horns for 9 months

Oviduct: Site of fertilization between egg and sperm

Ovary: produces estrogen and progesterone and the eggs development location



Male



1. _____

4. _____

7. _____

2. _____

5. _____

3. _____

6. _____

8. _____

Testicles: Located outside the body in the scrotum and produces spermatozoa and testosterone

Epididymis: Attached to one side of the testicle and site of spermatozoa maturation

Vas deferens: Pathway for sperm to the penis

Accessory sex glands: Add fluid that support and nourish sperm

Penis: Deposits semen in vagina during natural breeding



Activity 6.3

Reproduction Rescue

Can you answer the following questions about reproduction?
Use the internet to help you find the answers.

What is a freemartin, and why is it a concern?

How does estrus synchronization work?

Explain the process of artificial insemination. Why might it be helpful?

What is embryo transfer, and how does it work?

What is in vitro fertilization?



Activity 6.4

Guessing Genomics

Name three types of samples from a cow that can be used in genomic testing.

1. _____
2. _____
3. _____

How to Label a Sire Summary:

For a full explanation of sire summaries, visit this resource:

<https://shawano.extension.wisc.edu/files/2010/12/UnderstandingGenetics-the-Sire-Summaries-Workbook.pdf>

Use the two sire summary examples below to determine which cow is better for which farmer.

7HO13740 Rolan

PROGENESIS MODEST ROLAN 512 born: 5/24/2016

sire: MODESTY
dam: PEAK BOMBERO MAXIMA-ET 83
pedigree: MODESTY x BOMBERO x RANSOM
breeder: PROGENESIS LP/ALFONSO AHEDO

CDCB SUMMARY				72 dtrs 33 herds		
TPI	2703	NM\$	634	CM\$	653	
Milk	657	SCS	3.11	Mas	1.2	
Fat	85	0.21%	PL	3.8	Met	1.4
Protein	33	0.04%	FI	-0.4	DA	0.2
CFP	118	DPR	-0.3	Ket	1.3	
Feed Eff	183	LIV	1.1	RP	0.3	
				MFv	0.0	

HAUSA TYPE SUMMARY			10 dtrs 7 herds		
PTAT	1.03	UDC	1.47	FLC	0.87
stature					-0.57
strength					-0.55
body depth					-0.29
dairy form					0.63
rump angle					-0.08
rump width					-0.26
legs-side					0.53
legs-rear					0.27
foot angle					0.06
FLS					0.86
fore udder					0.95
RUH					2.31
RUW					2.38
udder depth					-0.13
udder cleft					0.84
front TP					0.94
rear TP					1.22
teat length					1.06

ZOETIS DATA	
DWPS	652
WTS	19
Mastitis	96
Lameness	105
Metritis	108
RP	102
DA	93
Ketosis	103
Abortion	96
CWS	-36
Calf Liv	95
Calf Scours	99
Calf Resp.	95

CALVING TRAITS	
SCE	1.8
DCE	1.3
SSB	5.6
DSB	4.2

MILK PROTEINS	
beta casein	A1A1
kappa casein	EE

250HO15322 Hanley

SIEMERS AVZ HANLEY 31445-ET born: 5/8/2019

sire: ALVAREZ
dam: SIEMERS DOC HANAN 28286-ET 88
pedigree: ALVAREZ x DOC x MONTEREY
breeder: SIEMERS HOLSTEINS

CDCB SUMMARY				72 dtrs 33 herds		
TPI	2615	NM\$	387	CM\$	406	
Milk	785	SCS	2.83	Mas	0.6	
Fat	51	0.07%	PL	1.9	Met	0.1
Protein	33	0.03%	FI	-1.6	DA	0.4
CFP	84	DPR	-2.1	Ket	1.0	
Feed Eff	92	LIV	-1.8	RP	-0.4	
				MFv	0.0	

HAUSA TYPE SUMMARY			10 dtrs 7 herds		
PTAT	3.16	UDC	2.39	FLC	1.97
stature					3.12
strength					2.42
body depth					2.40
dairy form					1.54
rump angle					1.23
rump width					1.97
legs-side					-0.60
legs-rear					2.41
foot angle					2.76
FLS					2.49
fore udder					3.35
RUH					3.28
RUW					3.02
udder depth					2.65
udder cleft					2.17
front TP					2.29
rear TP					2.32
teat length					-0.34

ZOETIS DATA	
DWPS	339
WTS	-29
Mastitis	97
Lameness	99
Metritis	100
RP	100
DA	103
Ketosis	105
Abortion	103
CWS	12
Calf Liv	101
Calf Scours	101
Calf Resp.	103

CALVING TRAITS	
SCE	2.5
DCE	2.1
SSB	5.8
DSB	4.7

MILK PROTEINS	
beta casein	A2A2
kappa casein	AB

1. Farmer A is looking to lower his somatic cell count.

Which of the two cows should he purchase? _____

2. Farmer B owns a value-added cheese business and is hoping to add one of the two cows into his herd.

Which cow should he choose? _____

3. Farmer C is looking to increase his milk production.

Which cow should he buy? _____

4. Farmer D wants to add a new cow to his show cows.

Which cow would place better in a show? _____



Extra Sources

Reproduction Tract:

- More information:

Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

Link: https://www.youtube.com/watch?v=LaXu-FoU7Cw&list=PLNXP12SwUle1lA0HKpoj1kY5koq_IZE0s&index=5

- Games:

Link: <https://www.purposegames.com/game/cow-reproductive-tract>

Link: <https://www.purposegames.com/game/bull-reproductive-tract>

Link: <https://www.realityworks.com/wp-content/uploads/2020/04/Animal-Anatomy-Handouts.pdf>

Sire Summary:

- More information:

Link: <https://extension.missouri.edu/publications/g2032>



Answer Key

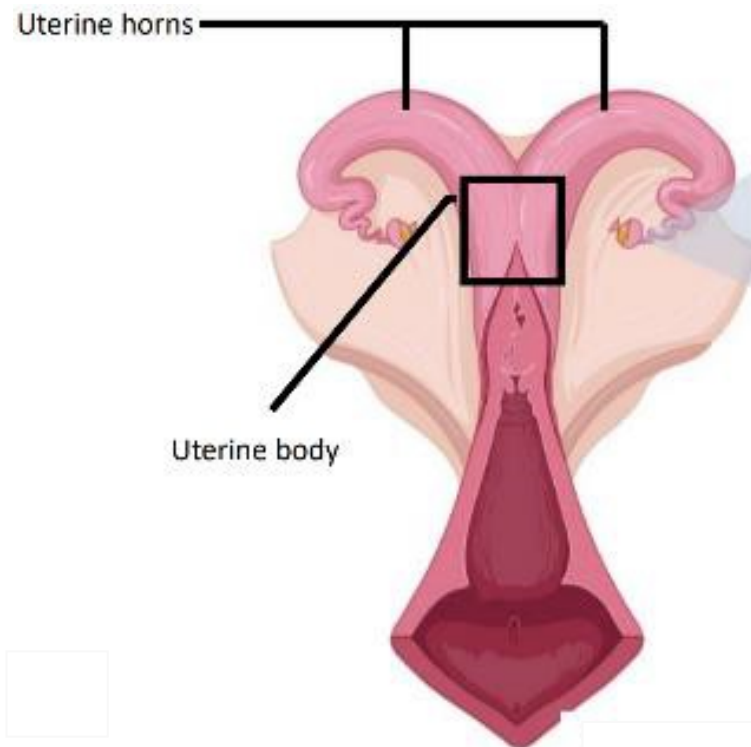
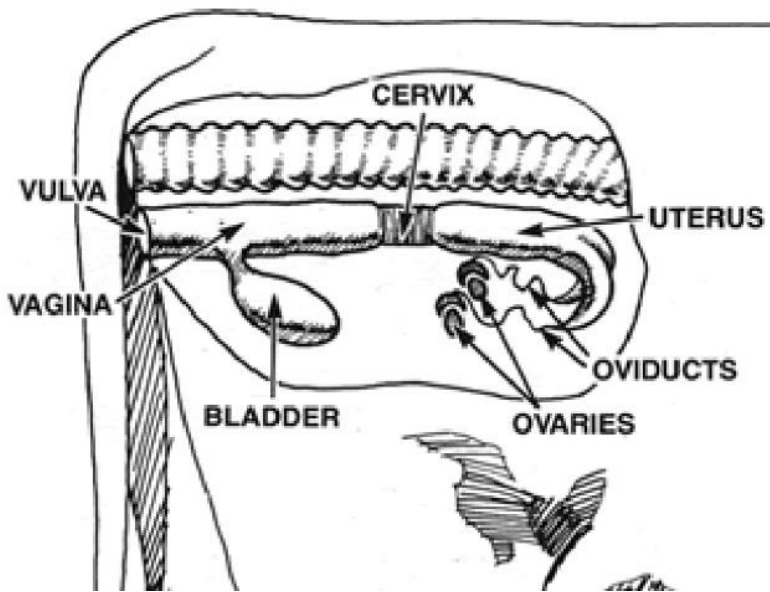
Unit 6: Genetics and Reproduction

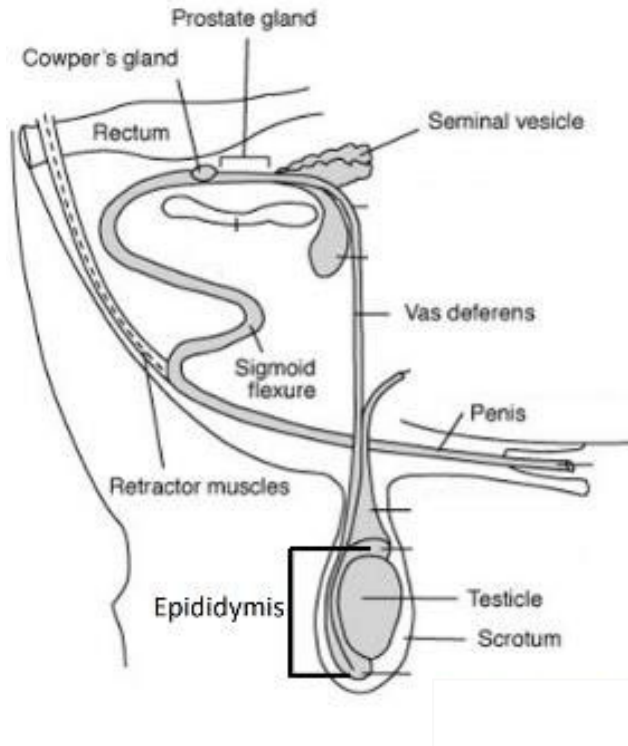
Activity 6.1

MPSPORUTAT
 NRSESATU
 ASDIOYCT
 OTESTGAIN
 OESTRSU LCECY
 GIENCMSO
 SRUETS
 APUEMPRTTR

POSTPARTUM
ANESTRUS
DYSTOCIA
GESTATION
ESTROUS CYCLE
GENOMICS
ESTRUS
PREPARTUM

Activity 6.2





Activity 6.3

What is a freemartin, and why is it a concern?

- A freemartin is a bull and heifer combination of calves carried at the same time. The male hormones in the uterus of the pregnant cow prevents the heifer's reproductive tract from forming.

How does estrus synchronization work?

- Administering a series of hormones to induce a group of cows or heifers to be fertile at a chosen time period, which makes it easier to determine when the cows are in heat.

Explain the process of artificial insemination and why might it be helpful?

- A vial containing a sample of healthy sperm is put into the AI rod and into the vagina, through the cervical opening and into the uterus. Then, the person pushes the sperm sample through the tube into the uterus. AI places the sperm closer to the oviduct and allows for an increase of genetic diversity into the herd due to the ability to ship sperm from anywhere.

What is embryo transfer and how does it work?

- The embryo transfer process begins with cows receiving a hormone treatment to produce more than one ovulation (egg) at a time. The cows are then artificially inseminated with bulls also possessing desirable genetics. Seven days later, a veterinarian recovers the embryos by using a catheter and recovery fluid. Any fertilized embryos captured in the process can be transferred into a surrogate cow, called a recipient, that will carry the pregnancy to term, or the embryos can be frozen to be used later.



What is in vitro fertilization?

- The process of harvesting oocytes (unfertilized eggs) from a cow and fertilizing them in a petri dish

Activity 6.4

1. Blood
 2. Saliva
 3. Hair
- *any order

1. Hanley

2. Rolan

3. Hanley

4. Hanley



Dairy

Unit 7: Dairy Products and Processing

Project Outcomes Addressed:

- Define pasteurization and explain why it is important.
- Describe three types of pasteurization and the benefits of each.
- Describe the equipment used in processing the following dairy products: butter, milk, ice cream, and cheese.
- List 10 retail nondairy products produced from dairy cattle.

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. Pasteurization Party
2. What Equipment is Used Where?
3. There is a Cow in My Marshmallow!



Activity 7.1

Pasteurization Party

Answer the following questions. Use the link for help:
<https://www.idfa.org/pasteurization>

Watch the Video:

https://www.youtube.com/watch?v=nBjOi_b00w

What is pasteurization, and why is it important?

Describe three types of pasteurization and the benefits of each.



Activity 7.2

What Equipment is Used Where?

Name three pieces of equipment used in making the following dairy products: butter, milk, ice cream, and cheese.



1. _____
2. _____
3. _____



1. _____
2. _____
3. _____



1. _____
2. _____
3. _____



1. _____
2. _____
3. _____



Activity 7.3

There is a Cow in My Marshmallow!

List ten retail nondairy products produced from dairy cattle:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____



Extra Sources

Pasteurization:

- More information:

Link: <https://www.vdh.virginia.gov/environmental-health/food-safety-in-virginia/milk-safety/pasteurization/#:~:text=Pasteurization%20involves%20heating%20liquids%20at,%3D%20all%20bacteria%20are%20destroyed>)

Link: <http://veterinarysciencehub.com/7-various-methods-of-pasteurization/>

Equipment Used in Dairy Products Production:

- More information:

Link: <https://www.ancoequipment.com/post/different-types-of-dairy-processing-machinery-used-in-dairy-farms>

Link: <https://www.youtube.com/watch?v=1N5UgUzDnpl&list=PLNXP12SwUle3sWedJnl4N7QntcWI-kaA8&index=26>

Nondairy By-Products from Dairy Cattle:

- More information:

Link: <http://www.buzzardsbeat.com/2017/12/what-by-products-do-we-get-from-cattle.html/>

- Games:

Link: <https://www.nmfarmandranchmuseum.org/wp-content/uploads/2020/12/Beef-and-Dairy-Byproducts-3-5-reduced.pdf>



Answer Key

Unit 7: Dairy Products and Processing

Activity 7.1

What is pasteurization and why is it important?

- Pasteurization is a process by which milk is heated to a specific temperature for a set period of time to kill harmful bacteria that can lead to diseases like as listeriosis, typhoid fever, tuberculosis, diphtheria and brucellosis

Describe three types of pasteurization and the benefits of each.

- Batch Pasteurization / low temperature long term pasteurization
 - Every particle of milk is subjected to a temperature of 63°C or 145°F for 30 min followed by prompt cooling to 5°C or below.
 - Benefits:
 - It is useful for handling small quantity of milk.
 - It does not involve sophisticated equipment.
 - Milk is not wasted during this process.
- High Temperature Short Time
 - Heating of milk – 72°C or 161.6°F for 15 sec. – cooling to 5°C or 41°F or below.
 - Benefits
 - This is useful for handling large quantity of milk.
- Ultra-High Temperature treatment
 - Every particle of milk is subjected to a temperature time combination of 135°C – 150°C or 275°F - 302°F without holding for 2 seconds.
- Ultra-Pasteurized
 - In this process milk is heated with a direct steam up to 150°C or 275°F for a fraction of a second.



Activity 7.2

- Butter: Butter churn, pasteurizer, and separator
- Milk: Holding tank, pasteurizer, separator, clean in place system, and homogenizer
- Ice cream: Pasteurizer, continuous freezer, separator, refrigerated mix tank, aging tank, and blast freezer
- Cheese: pasteurizer (fresh cheese), cheese vat, cheese mold, drain table, cheese press, storage racks (aging cheese)

Activity 7.3

There's A Cow In My Marshmallow!

Can you find the By-Products?

By-Products From Hide and Hair

Baseball Gloves
Car Upholstery
Drum Heads
Leather Coats
Violin Strings
Shoes
Felt Hats
Luggage
Wallets
Leather Watchbands
Rawhide Softballs

**By-Products From Glands and Organs**

Asphalt	Paint
Cosmetics	Plastic
Fertilizer	Soap
Insulation	Tires
Medicines	

By-Products From Bones and Horns

Bone China	Candies	Chewing Gum	Comb
Ice Cream	Knife Handles	Lipstick	Photo Film
Piano Keys	Vitamin Capsules	Wallpaper Paste	

Image courtesy Florida Beef Council



Dairy

Unit 8: Performance Measurements

Project Outcomes Addressed:

- Distinguish between voluntary and involuntary culls.
- Calculate the following: pregnancy rate, conception rate, heat detection rate, days to first service, calving interval, death-loss percentage, somatic cell score and stocking density.
- Define and apply the following scoring systems: body condition, hygiene score, lameness score and teat end score.

You will need:

- Pencil
- Calculator
- Access to the internet

Activities in this unit:

1. Too Cull, or Not To Cull?
2. Cattle Calculations
3. Score!



Activity 8.1

Too Cull, or Not To Cull?

Place the scenarios in the appropriate box.

Word Bank

Illness	Surplus of Cows	Lameness
Low Milk Production	Injury	Unforeseen Death

Involuntary
Culling

Voluntary
Culling



Activity 8.2

- 100 cows currently in the herd
- 110 cow spaces on property
- 10 cows are eligible to be bred
- 4 cows are detected in Heat (AI)
- 2 cows become pregnant
- Cow A calved on April 4th, 2017
- Cow A was inseminated on June 6th, 2017
- Cow A calved March 15th, 2018
- 2 cows died
- Somatic cell count is 200,000

$$\text{Heat Detection rate} = \frac{\text{Number of Cows Detected to be Bred}}{\text{Number of Cows Eligible to be Bred}} \times 100$$

Number of Cows Eligible to be Bred

$$\text{Conception Rate} = \frac{\text{Pregnant Cows}}{\text{Number of Cows Inseminated}} \times 1000$$

$$\text{Pregnancy Rate} = \text{Heat Detection Rate} \times \text{Conception Rate} \div 100$$

$$\text{Days of First Service} = \text{Day of calving} - \text{Day of First Insemination}$$



Calving Interval = Days During Pregnancy A - Day of Conception for Pregnancy B

$$\text{Deaths Loss Percentage} = \frac{\text{Number of Deaths}}{\text{Number of Cattle in the Herd Number of Cows Currently on Property}} \times 100$$

$$\text{Stocking Density} = \frac{\text{Number of Cows}}{\text{Total Number of Cow Spaces on Property}} \times 100$$

$$\text{Somatic Cell Score} = \log_2 \left(\frac{\text{Somatic Cell Count}}{100,000} \right) + 3$$



Questions:

What is the heat detection rate? _____

What is the conception rate? _____

What is the pregnancy rate? _____

What is the days of first service? _____

What is the calving interval for pregnancy A? _____

What is the death loss percentage? _____

What is the stocking density? _____

What is the somatic cell score? _____

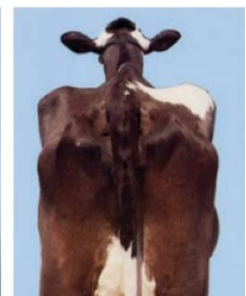
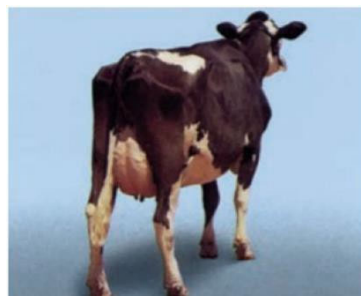
Activity 8.3

Score!

Looking at the body condition score, hygiene score, lameness score, and teat end score, determine the correct scoring for each picture.

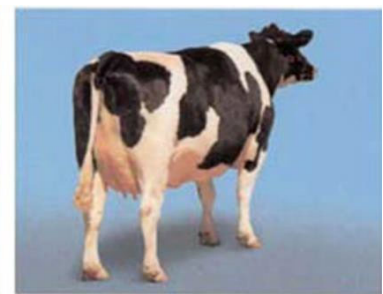
The **Body Condition Score** is a 5-point scale with increments of .25. Ideal locations to look for excess fat or noticeable skinniness is the backbone, hips, shoulder bone, ribs, and tail-head. The ideal score is a 3 for mid lactation cows and a 3.25 to 3.75 for late lactation cows. Video link: <https://www.youtube.com/watch?v=wASXNnCTCU>

Determine the score for the following pictures:



A. _____

B. _____



C. _____

D. _____



E. _____

The **Hygiene Score** is a 4-point scale with increments of 1. Ideal locations to look for dirt or manure are the lower legs, udder and flank and upper legs. The ideal score would be a 1 or 2.

Video link:

https://media.ed.ac.uk/media/10A+Hygiene+in+the+shedF+Let+the+cows+tell+you%21+Scoring+system/1_dqrb4jrx

Determine the score for the following pictures:



F. _____



G. _____



H. _____



I. _____

The **Lameness Score** is a 3-point scale with increments of 1. Ideal locations to look for lameness are while the animal is walking, their ability to get up and if they look sickly (losing weight). The ground should be flat with no obstacles. The ideal score would be a one.

Video link: <https://www.youtube.com/watch?v=WVqFeLZcZ48>

Determine the score for the following clinical descriptions:

Severely lame; trying to avoid bearing weight on limb

J. _____

Favors a limb when walking

K. _____

Sound with a healthy gait

L. _____



The **Teat End Score** is a 4-point scale with increments of 1. Ideal locations to look are the teat ends before milking. The ideal score would be a 1.

Video link: <https://www.youtube.com/watch?v=9Je9fzEW1IE>

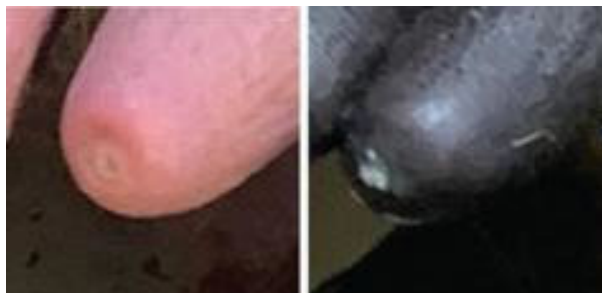
Determine the score for the following clinical descriptions:



M. _____



N. _____



O. _____



P. _____



Extra Sources:

Calculations:

- More information:

Link: <https://extension.tennessee.edu/publications/Documents/W872.pdf>

Scoring:

- More information:

Link: <https://www.youtube.com/watch?v=WVqFeLZcZ48>

Link: <https://utdairy.tennessee.edu/wp-content/uploads/sites/104/2020/11/DairySkillathonStudyguide2020.pdf>

Link: <https://www.vetmed.wisc.edu/fapm/wp-content/uploads/2020/01/hygiene.pdf>

Link: <https://dairylandvet.net/storage/app/media/Archivefile/DVS/newslettermarch-2017-teat-end-scoring.pdf>

Link: <https://www.youtube.com/watch?v=FZJat LIB6c>



Answer Key

Unit 8: Performance Measurements

Activity 8.1

Involuntary Culling	Voluntary Culling
<ul style="list-style-type: none">• Illness• Lameness• Injury• Unforeseen death	<ul style="list-style-type: none">• Surplus of Cows• Low Milk Production

Activity 8.2

What is the heat detection rate? 40%

What is the conception rate? 50%

What is the pregnancy rate? 20%

What is the days of first service? 63

What is the calving interval for pregnancy A? 345 days

What is the death loss percentage? 2%

What is the stocking density? 90.9%

What is the somatic cell score? 3.3



Activity 8.3

- A. 1
- B. 2
- C. 4
- D. 5
- E. 3

- F. 2
- G. 3
- H. 1
- I. 4

- J. 3
- K. 2
- L. 1

- M. 3
- N. 2
- O. 1
- P. 4



Dairy

Unit 9: Economics and Marketing

Project Outcomes Addressed:

- Describe the Federal Milk Marketing Orders and its effect on milk prices.
- Describe the four classes of milk utilization and how it effects milk prices in your area.
- Identify three non-milk sources of dairy farmer income.
- Create a list of the incoming revenue and outgoing expenses on an average dairy farm.

You will need:

- Pencil
- Access to the internet

Activities in this unit:

1. FMMO: Federal Milk Marketing Order
2. Money In; Money Out



Activity 9.1

FMMO: Federal Milk Marketing Orders What are the Federal Milk Marketing Orders?

How do the Federal Milk Marketing Order effect milk prices?

Can you determine the four classes of milk and what dairy product fits into each category?

Class I	Class II	Class III	Class IV

Word Bank

Butter	Whey	Ice Cream	Cottage Cheese	Milk Powder
Cream Cheese	Fluid Milk	Yogurt	Hard Cheese	



Activity 9.2

Money In Money Out

Identify three non-milk sources of dairy farmer income:

1. _____

2. _____

3. _____

Can you create a lists of incoming revenue and outgoing expenses on an average dairy farm?

Think of five incoming revenues and 5 outgoing expenses:

Revenue:

1. _____

2. _____

3. _____

4. _____

5. _____

Expenses:

1. _____

2. _____

3. _____

4. _____

5. _____



Extra Sources

FMMO:

- More information:

Link: https://www.fb.org/files/2019FMMO/How_Milk_is_Priced.pdf

Link: <https://www.fb.org/issue/farm-policy/federal-milk-marketing-order-reform#:~:text=Milk%20prices%20regulated%20by%20Federal,milk%20into%20finished%20dairy%20commodities.>



Answer Key

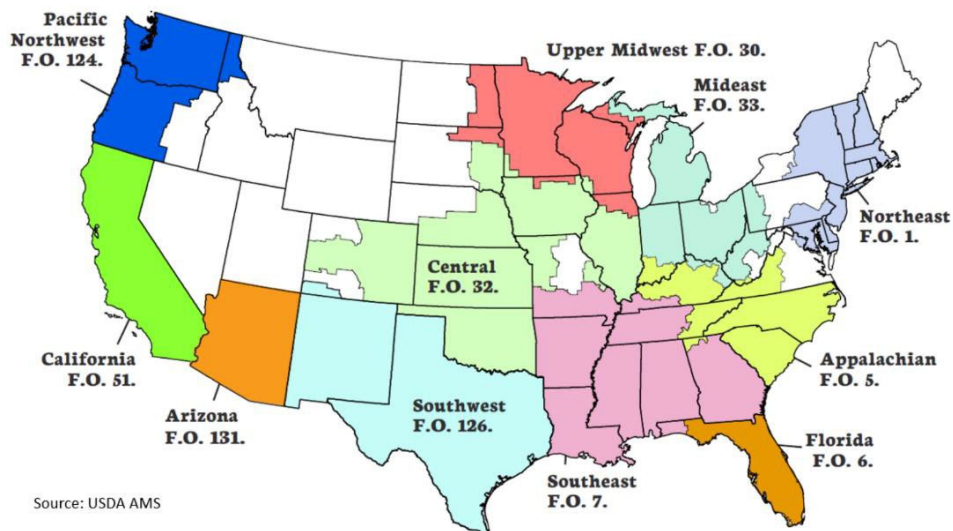
Unit 9: Economics and Marketing

Activity 9.1

What is the Federal Milk Marketing Order?

Federal Milk Marketing Orders establish certain provisions under which dairy processors purchase fresh milk from dairy farmers supplying a marketing area. A marketing area is generally defined as a geographic area where handlers compete for packaged fluid milk sales, although other factors may be taken into account when determining the boundaries of a marketing area. Federal orders serve to maintain stable marketing relationships for all handlers and producers supplying marketing areas, thus facilitating the complex process of marketing fresh milk.

Figure 1. Federal Milk Marketing Orders



How does the Federal Milk Marketing Order effect milk prices?

Milk pricing regulations in Federal Milk Marketing Orders are among the most complicated commodity pricing regimes across all of agriculture. Milk pricing regulations in place today stem from pricing reform in 2000 that introduced end-product pricing formulas, by which regulated milk handlers are required to pay producers based on their utilization of the milk. Producers in a marketing area (Figure 1) share in the proceeds of all milk sales “pooled” on an order, and the regulated minimum milk price reflects the end-product pricing formulas and the farm’s share of the revenue sharing pool. For nearly 20 years there were only 10 milk marketing orders, but in September 2018

California was introduced into the FMMO system as a result of the 2014 Farm Bill. Today, there are 11 FMMOs in the United States. These prices are used to determine two-week and monthly weighted average commodity values. The two-week prices are used to determine advanced pricing factors for pricing fluid milk products. The monthly weighted average prices are used to determine both the component value and the classified value of milk. Both the two-week and monthly prices utilize end-product pricing formulas (described below) to determine the classified value.

Class I	Class II	Class III	Class IV
<ul style="list-style-type: none"> • Fluid Milk 	<ul style="list-style-type: none"> • Ice Cream • Cottage Cheese • Yogurt 	<ul style="list-style-type: none"> • Hard Cheese • Whey • Cream Cheese 	<ul style="list-style-type: none"> • Butter • Milk Powder

Activity 9.2

1. Crops / farming
2. Selling dairy or beef cattle for meat
3. Cull cattle sales
4. Other full or part-time jobs

1. Fluid milk sales
2. Cull sales
3. Value-Added business (Selling cheese, ice cream, anything dairy that is not fluid milk)
4. Crop sales
5. Government payouts

1. Feed
2. Vet bills
3. Labor costs
4. Utilizes
5. Taxes

*There could be more than what is listed above



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4. https://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy17/adg_-_preweaned-holstein-heifer.pdf
5. <https://www.uidaho.edu/-/media/UIdaho-Responsive/Files/Extension/4-H/Animal-Science-Lesson-Plans/Nutrition-ADG-L1-ALL-CKinder.pdf?la=en&hash=0466EB40089F14B7AF03BFE21B6225F512397E86>
6. https://www.canr.msu.edu/uploads/236/65684/4H1669_AnimalScienceAnywhere-LivestockInjections.pdf
7. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7153313/#:~:text=Carbohydrates%2C%20amino%20acids%2C%20fatty%20acids,produce%20milk%20and%20milk%20components.>
8. [https://extension.psu.edu/carbohydrate-nutrition-for-lactating-dairy-cattle#:~:text=Carbohydrates%20\(CHO\)%20are%20the%20major,of%20maintenace%20and%20milk%20production.](https://extension.psu.edu/carbohydrate-nutrition-for-lactating-dairy-cattle#:~:text=Carbohydrates%20(CHO)%20are%20the%20major,of%20maintenace%20and%20milk%20production.)
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10. <https://www.aces.edu/blog/topics/beef/estrus-synchronization-and-artificial-insemination-programs-for-beef-cattle/#:~:text=Part%20of%20a%20successful%20AI,the%20cows%20are%20in%20heat.>
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31. <https://www.purinamills.com/horse-feed/education/detail/horses-don-t-eat-feed-tags>



Congratulations!

You have now completed the Intermediate Dairy Project curriculum.



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