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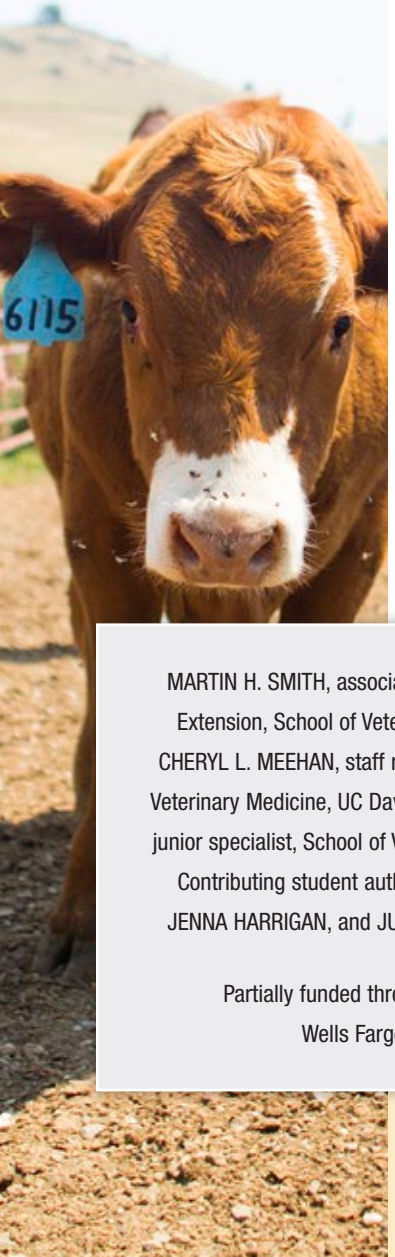

Pre-Harvest Food Safety in 4-H Animal Science

Part 4: Decision-Making and Owner Responsibilities

OVERVIEW AND BACKGROUND INFORMATION

Seeking veterinary care for sick animals is very important. If a diagnosis requires a particular type of treatment, it is important to follow a licensed veterinarian's instructions to maximize the animal's chances for a full recovery. After treatment has been completed, a residue of the medicine may remain in the animal for a period of time. The time it takes for that residue to leave the animal is the **withdrawal period,** and it must be taken into consideration when raising and selling food-producing animals. It is important that no residues remain in the meat of any animal, or in any food products from the animal. Human consumption of these residues can be harmful.

An animal can get sick from harmful bacteria (i.e., those that can cause illness). One type of treatment against bacteria is the administration of antibiotics. There are two major types: **broad-spectrum** and **narrow-spectrum** antibiotics. Broad-spectrum antibiotics fight against a wide range of disease-causing bacteria, while narrow-spectrum antibiotics are only effective against specific families of bacteria.

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It is also very common for animals to be infected with parasites, both internal and external. There are many effective treatment options for parasites. However, choosing the right treatment option can get complicated when taking into consideration how the illness may affect exhibition of the animal at fairs, costs of medication and treatment, the medicines' withdrawal periods, and how those may affect selling the animals or animal products.

Activity Concepts and Vocabulary

- **Antibiotic:** A chemical substance, produced by a microorganism, that has the capacity to inhibit the growth of or kill other microorganisms. Antibiotics that are not toxic to the host animal are used to treat various infectious diseases.
- **Antibiotic resistance:** The ability of a microorganism to withstand the effects of antibiotic treatment.
- **Broad-spectrum antibiotic:** An antibiotic that is effective against a wide range of disease-causing bacteria.
- **Narrow-spectrum antibiotic:** An antibiotic that is effective against only specific families of bacteria.
- **Parasite:** An organism that lives in or on another organism and affects that organism in a negative way.
- **Withdrawal period:** The time period required to withhold an animal from slaughter or dispose of its milk after it has been treated with a medication.

Life Skills

- **Head:** Keeping records, planning/organizing, critical thinking, problem solving, decision making
- **Heart:** Sharing, cooperation, communication
- **Hands:** Contributions to group effort, teamwork
- **Health:** Disease prevention, personal safety, self-responsibility

Subject Links:

Science, language arts

Next-Generation Science Standards (NGSS) Crosscutting Concepts

- Cause and Effect: Events have causes, sometimes simple, sometimes multi-faceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
- Patterns: Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Purpose of Activity

The purpose of this activity is to have youth understand the responsibilities of raising animals for human consumption. It is very important to know what is required in raising a healthy animal prior to harvest, as well as to know what precautions need to be taken in the event an animal contracts an illness. The goal is to have the youth learn the importance of protecting their animal from prolonged illnesses, the recurrence of an illness, and the spread of illness to other animals. This activity demonstrates to the youth that even with a veterinarian's help and proper treatment, the responsibility of keeping a pre-harvest animal healthy may include very tough decisions, the outcomes of which can have lasting effects on the animal and on humans.

Overview of Part 1: Antibiotics

This activity focuses on the decision-making process for treating a sick animal. It emphasizes the importance of contacting a veterinarian and making decisions related to recommended treatments. Youth will make decisions based on the type of treatment, the length of the treatment, the withdrawal period for the treatment, as well as taking into consideration the scheduling of county fairs and shows. The youth will have the opportunity to understand how their decisions can affect the health of their animals.

Overview of Part 2: Parasites

Similar to Part 1, Part 2 focus on the decision-making process when treating animals infected with internal and external parasites. With suggestions from a veterinarian, the youth will need to think critically and take into consideration complex treatment options, withdrawal time periods, cost requirements, and fair dates when deciding how to treat an animal infected with parasites.

PART 1: Antibiotics

Time Required
40–60 minutes

Suggested Grouping
Pairs

Materials Needed
(= Materials provided in curriculum)*

- * *Fair Information*
- * *Journal*
- * *Antibiotic Information*
- * *Animal Scenario*
- * *Blank Calendars*
- Writing utensils
- Flip chart paper

Getting Ready
- Divide the youth into pairs.
- Make enough copies of *Fair Information, Journal, Antibiotic Information,* and *Blank Calendars* for each pair.
- Make enough copies of the *Animal Scenario* so each pair of youth gets a scenario.
- Make sure there are enough writing utensils and flip chart paper for each pair of youth.

Opening Questions
1. When you are sick and your doctor gives you medicine, why do you think it is important to follow your doctor's directions? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
2. When your animal is sick and the veterinarian gives you medicine to give to your animal, why do you think it is important to follow your veterinarian's directions? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
3. What do you think some of the consequences could be if you were not to follow your doctor's or your veterinarian's directions? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.

Procedure (Experiencing)
1. Pass out a copy of the *Animal Scenario* to each pair.
2. Give each pair *Blank Calendars, Journal,* and *Fair Information* sheets.
3. Ask the youth to read through the *Fair Information* sheet. Have them write information mentioned on the *Fair Information* sheet on the corresponding dates on their *Blank Calendars.*
4. Next, ask each pair to choose the fair they would like to attend from the *Fair Information* sheet. Ask them to record which fair they have chosen and the reasons for their choice under Part 1 on their *Journal.*
5. Pass out the *Antibiotic Information* sheet and a copy of the *Animal Scenario* to each pair.
6. Give each pair time to read their *Animal Scenario.* Have them use their *Blank Calendars* to record any important new information.
7. Using the *Antibiotic Information* sheet and the information they recorded on their *Blank Calendars,* have each pair decide which antibiotic treatment (broad-spectrum or narrow-spectrum) they would like to use on their animal, and record this information under Part 1 on their *Journal.*
8. Looking at the fair they chose in Part 1 of their *Journal,* have each pair discuss how their choice of antibiotic might affect their fair plans. Have them write their response under Part 1 on their *Journal.*

Sharing, Processing and Generalizing
Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. Ask the youth to share with the entire group the information recorded in their *Journal* regarding treatment for their animal and their choice of fair. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include

1. What do you think you need to consider before deciding on a treatment for your animals? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
2. What do you think are major factors to consider when choosing a fair? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
3. How might you think about situations similar to this in the future? How might this exercise help you when you plan future projects that involve food-producing animals? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.

PART 2: Parasites

Time Required
40–60 minutes

Suggested Grouping
Pairs

Materials Needed
(= Materials provided in curriculum)*

- * *Parasite Chart*
- * *Parasite Scenarios*
- * *Blank Calendars*
- * *Fair Information*
- * *Journal*
- Writing utensils
- Flip chart paper

Getting Ready
- Make enough copies of the *Parasite Chart* and *Blank Calendars* for each pair of youth to have one.
- Make enough copies of the *Parasite Scenarios* so each pair gets one scenario. Cut the scenarios out.
- Make sure there are enough writing utensils and sheets of flip chart paper for the youth.

Procedure (Experiencing)
- Randomly pass out one *Parasite Scenario* and a *Parasite Chart* to each pair. Have each pair write the type of animal they have on the *Journal* under Part 2.
- Ask the youth to read through the *Fair Information* sheet. Have them write information mentioned on the *Fair Information* sheet on the corresponding dates on their *Blank Calendars.*
- Next, ask each pair to choose the fair they would like to attend from the *Fair Information* sheet. Ask them to record the fair they have chosen and the reasons for their choice on the *Journal.*
- Ask the youth to read through their *Parasite Scenarios* and write down any important information on their new *Blank Calendar.*
- Using the information provided from the *Parasite Scenarios* and the *Parasite Chart,* have each pair decide which treatment option they would like to use on their animal and their reasons for making that choice. Have them record this information under Part 2 of their *Journal.*
- Looking at the fair they chose, have each pair discuss how their choice of treatment might affect their fair plans. Have them write their response under Part 2 of their *Journal.*

Sharing, Processing, and Generalizing
Follow the lines of thinking developed by the youth as they share and compare their thoughts and observations. Ask the youth to share with the entire group the information recorded in their *Journal* regarding their choice of treatment for their animal and their choice of fair. If necessary, use more targeted questions as prompts to get to particular points. Specific questions might include

1. How did each pair go about making a decision on the type of treatment for their animal? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
2. What do you think are major considerations when choosing a treatment option? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.
3. How might you go about making similar decisions in the future with your own pre-harvest animal? Ask the youth to share their ideas verbally or write their thoughts and ideas on the flip chart paper provided.

Concept and Term Introduction
At this point, volunteers need to ensure that the concepts and terms **antibiotic, antibiotic-resistance, broad-spectrum, narrow-spectrum, parasite,** and **withdrawal period** have been introduced. (**Note:** The goal is to have the youth develop these concepts through their own exploration and define the terms using their own words.)

Concept Application
1. Ask the youth to think about their food animal(s). How do they think they would go about choosing a treatment option for their animal(s)?
2. Ask the youth to list factors that influence their decisions when choosing a treatment. Ask them to list the factors in order of importance (e.g., "1. Cost, 2. Withdrawal" would mean that the cost of the treatment is more important than the length of the withdrawal time).

Fair Information

Fair 1: July 4

Distance: 110 miles away from your home
This fair is show only. The registration fee is $20 per animal and the prize money is $80. Vet checks will be performed at arrival. Your animal must be healthy. Animals that are being treated for illnesses may not participate in the show. Animals that are still in their withdrawal period are welcome to register and participate.

Fair 2: July 14

Distance: About 25 miles away from your home
This fair will consist of a show and an auction. There is a low registration fee and a great chance to win in the show because few people travel to this fair. The prize money is $100. There will not be vet checks and there is no requirement to declare whether your animal is taking any drugs.

Fair 3: July 22

Distance: About 180 miles away from your home
This fair is show only. There will not be vet checks and there is no requirement to declare whether your animal is taking any drugs. There are no registration fees but you are required to sign up all animals that are brought onto the fair ground. Prize money is about $30 to $35.

Fair 4: July 26

Distance: About 8 miles away from your home
This fair is hosting both show and auction. The registration fee is $30 per animal. The show prize money is about $45. Many people come to this fair because they want to purchase animals that are in excellent shape at the auction. If you have raised your animal well, you have a great chance at a high auction price for your animal! Animals that have been on medication and are still within their treatment or withdrawal period may not be registered or allowed to participate.

Fair 5: August 1

Distance: 150 miles away from your home
This fair will consist of both show and auction. Every year, this fair is very well known for its very large show money prize! Although there is a pricey registration fee, many participate year after year. There will be vet checks upon registration and drug records must be submitted. All terminal animals must be drug-free—no exceptions!

Fair 6: August 5

Distance: Only 50 miles away from your home
This will be a show only fair. All animals may participate with only a $5 entrance fee. If your animal is being medicated or is still in its withdrawal period, you must declare the drug(s) that you have given to your animal in order to participate. This show is well known as an event for just having a good time and showing off your great animals! There is no prize money.

Fair 7: August 19

Distance: 200 miles away from your home
This fair will have both show and auction. Fewer animals go to this fair so there is a greater chance of winning in the show. The prize money is about $35 to $40. Many animals are sold at this auction for high prices every year. All animals must be drug free. Registration fee is fairly small.

Fair 8: August 25

Distance: Very close (25 miles away)
This fair will consist of both show and auction. Prize money is $100. Registration fee is $15 per animal. Your animal must be healthy. Animals cannot be actively receiving medications. This fair has a reputation for being lax with respect to enforcement of rules and show arenas are often dirty.

JOURNAL

PART 1: ANTIBIOTICS

Animal: STEER

Fair choice: _____

Reasons why you chose this fair:

_____

_____

_____

Antibiotic treatment: _____

Reasons why you chose this treatment:

_____

_____

_____

_____

_____

Did your antibiotic choice affect your fair plans? Would you change anything about either your fair plan or your antibiotic choice? If so, how would you change it?

_____

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PART 2: PARASITES

Animal: _____

Fair choice: _____

Reasons why you chose this fair:

_____

_____

_____

Please circle one: Internal Parasite or External Parasite

Parasite: _____

Treatment choice: _____

Reasons why you chose this treatment:

_____

_____

_____

_____

_____

How did your treatment choice affect your fair plans? Would you change anything about either your fair plan or your treatment choice? If so, how would you change it?

_____

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_____

ANTIBIOTIC INFORMATION

Narrow-Spectrum vs. Broad-Spectrum Antibiotics

Narrow-Spectrum Antibiotics

Advantages:

- Accurately fights off a specific bacterial infection
- Decreases the chances the bacteria will develop antibiotic resistance
- Increases the chances for raising a healthy food-producing animal

Disadvantages

- Usually has a longer withdrawal period than a broad-spectrum antibiotic
- Only effective against a limited number of pathogens

Broad-Spectrum Antibiotics

Advantages:

- Active against a broader spectrum of bacteria
- There is less need to identify the infecting pathogen with great certainty before you treat
- Usually has a shorter withdrawal period than a narrow-spectrum antibiotic

Disadvantages:

- Greater chance that bacteria will develop antibiotic resistance
- Because of its more profound effect, it may interfere with the ability of the animal's beneficial microorganisms to fight off harmful bacteria, thus increasing the chances it will be infected by other pathogens

Animal Scenarios

Steer

On July 8 you notice your steer is not behaving normally when you go out to feed him. You notice an unusual nasal and eye discharge. He has been breathing very fast and has been eating less than half the amount you feed him. Then you realize he has been having diarrhea and has a cough that appears to be getting progressively worse. You decide to call the veterinarian as soon as you get back from the barn. The veterinarian comes the next day to examine your animal and diagnoses the steer with Bovine Respiratory Disease. You are given two treatment options to start that day (July 9). Treatment 1 is a broad-spectrum antibiotic that is given orally for 14 days. This treatment will cost $14 and has a withdrawal period of 8 days. Treatment 2 is a narrow-spectrum antibiotic and is given by injections for 7 days. It will cost $30 and has a longer withdrawal period: 28 days. (Please refer to Antibiotic Information Sheet.)

Sheep

A few weeks after docking your lambs' tails and castrating the males, you noticed an illness has fallen over your lambs. They became severely bloated, with a depressed appetite. They were very stiff in their movements; some were exhibiting muscle spasms. It was obvious that your lambs were sick and were extremely stressed. You made the quick decision to call your veterinarian. He diagnosed your lambs with tetanus. You were given two treatment options. Treatment 1 is a broad-spectrum antibiotic that is injected into the muscle every day for 4 days. Although this treatment costs only $15, administering an intramuscular injection to your animal may be difficult and require an extra hand. This treatment has a withdrawal period of 8 days. Treatment 2 is a narrow-spectrum antibiotic that is injected only once, subcutaneously (under the skin). This treatment costs $60 and has a withdrawal period of 21 days. You will begin treating the animal on July 3. (Please refer to Antibiotic Information Sheet.)

Swine

About 1 month after weaning your pigs, you noticed that all of them were weak. They were experiencing diarrhea and were extremely dehydrated. As they were walking around, they seemed uncoordinated, struggling to stand up. You called your veterinarian to come out and examine your pigs. She came to the conclusion that your swine have Swine Dysentery. You were given two treatment options. Treatment 1 is a broad-spectrum antibiotic that is given orally for 14 days. It will cost about $12 and has no withdrawal period. Treatment 2 is a narrow-spectrum antibiotic, also given orally, and costing about $15. The treatment period is 5 days and the withdrawal period is 7 days. You will choose a treatment and start it on July 1. (Please refer to Antibiotic Information Sheet.)

Dairy

Your cow has recently hit a peak in her lactation. Yesterday you started noticing that her udders were extremely inflamed and warm. In addition to being red, they seemed painful to the touch. Today when you went to milk her, the milk appeared off-white in color and watery. Something was not right, so you decided to ask your veterinarian to stop by. After a full examination, he informed you that your dairy cow has mastitis. He gave you two treatment options. Treatment 1 is a daily injection into the infected teat canals that continues for 8 days. This treatment has a withdrawal period of 9 days and will cost $40. Treatment 2 costs $20 and is a daily subcutaneous (under the skin) injection for 3 days and has a withdrawal period of 30 days. You will start a treatment on July 6. (Please refer to Antibiotic Information Sheet.)

JULY 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

AUGUST 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Parasite Scenarios

Market Beef Cattle: Coccidiosis

You are in a market cattle project and started to raise a 9-month-old steer. Now it is 20 months old at 1,100 pounds and ready to be shown. On July 13, you started to notice some differences in your steer. You noticed watery and bloody manure. Over the next couple of days you noticed your animal is losing weight and has a poor appetite and poor coordination. You checked your steer's weekly growth reports over the last month and were disappointed because it showed poor growth. Worried, you asked your veterinarian to come out to your farm on July 17. Your veterinarian examined your steer, did some tests, and concluded that you steer has Coccidiosis. In order to treat Coccidiosis and maintain the health of your steer so you will be able to show it, you have to take care of this problem. Your veterinarian gave you a list of treatment options for your steer. You narrow it down to option A and option B. You do some research online and find a natural remedy, option C, that can also be used to treat Coccidiosis in beef cattle. From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 17, describe why you chose that particular treatment and what effect, if any, it will have on how you show your market steer. Please refer to the Parasite Chart for help in making your decision.

Market Beef Cattle: Lice

You are in a beef cattle project and started to raise a 6-month-old steer. Now it is 17 months old at 1,100 pounds and ready to be shown. On August 2, you start to notice your steer scratching more than usual. As the days pass, it seems like any opportunity your steer has to scratch, it will do so. It has gotten so bad that you notice remnants of blood on the objects it scratches against. One day you get an opportunity to get a close look at your steer. You are amazed to see the skin on its sides is completely raw.

Worried, you have your veterinarian come out to your farm on August 6. Your veterinarian examines your steer, does some tests, and concludes that your steer has lice. In order to treat lice and maintain the health of your steer for show, you have to take care of this problem. Your veterinarian gives you a list of treatment options for your steer. You narrow it down to option A and option B. You do some research online and find a natural remedy, option C, that can also be used to treat lice on beef cattle.

From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on August 6, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your steer. Please refer to the Parasite Chart to help make your decision.

Market Swine: Lungworm

You joined a pig project and started to raise a 4-month-old pig. Now it is 5 months old at 220 pounds and ready to be shown. On July 3, while your pig was resting, you noticed it periodically coughing. You didn't think much of it. Over the next couple of days, you noticed your pig was struggling to breathe and did not seem to want to eat. You checked her health records over the last few days and noticed a loss in weight. Worried, you took your pig to the veterinarian on July 14. Your veterinarian examined your pig, did some tests, and concluded that your swine has Lungworm. In order to treat Lungworm and maintain the health of your pig for show, you need to take care of this problem. Your veterinarian gave you a list of treatment options for your pig. You narrow it down to option A and option B. Then you do some research online and find a natural remedy, option C, that has been used on pigs. From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 14, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your pig. Please refer to the Parasite Chart to help make your decision.

Market Swine: Mange Mites

You are in a pig club and started to raise a 2-month-old pig. Now it is 5 months old at 220 pounds and ready to be shown. On July 11, while your pig was resting next to a tree, you noticed it periodically getting up to scratch against the tree. You didn't think much of it. You were gone for a week on a school trip so you had your younger brother look after your pig. When you returned from your trip, you were shocked to see lesions over your pig's body. There were some areas that were much worse, with the hair missing and the skin cracked, raw, and bloody.

Worried, you took your pig to the veterinarian on July 21. Your veterinarian examined your pig, did some tests, and concluded that your pig has mange mites. In order to treat mange mites and maintain the health of your pig for show, you have to take care of the problem. Your veterinarian gave you a list of treatment options for your pig. You narrow it down to option A and option B. You do some research online and find a natural remedy, option C. From these three treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 21, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your pig. Please refer to the Parasite Chart to help make your decision.

Parasite Scenarios, *continued*

Market Lamb: Haemonchus

You are in a market lamb club and started to raise a 3-month-old lamb. At 5 months old, your lamb weighs 145 pounds and is ready to be shown. On July 1, you noticed your lamb had very pale gums. Over the next few days, you noticed your lamb seemed weak and not motivated to move around. You also noticed some weight loss. Worried, you took your lamb to the veterinarian on July 5. Your veterinarian examined your lamb, did some tests, and concluded that your lamb has Haemonchus. In order to treat Haemonchus and maintain the health of your lamb for show, you have to take care of the problem. Your veterinarian gave you a list of treatment options for your lamb. You narrow it down to option A and option B. You do some research online and find a potential natural remedy, option C. From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 5, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your lamb. Please refer to the Parasite Chart to help make your decision.

Market Lamb: Lice

You are in a market lamb club and started to raise a 1-month-old lamb. Now it is 12 months old, weighs 145 pounds and is ready to be shown. On July 10, you started to notice it itching and scratching itself. Worried, you checked its coat but couldn't find the source of the itching. As the days progressed, the scratching got worse. It got to the point where your lamb seemed to pay more attention to scratching than eating. You noticed that it looked thinner and its coat looked dull with patches of coat loss.

Worried, you took your lamb to the veterinarian on July 14. Your veterinarian examined your lamb, did some tests, and concluded that your lamb has lice. In order to treat lice and maintain the health of your lamb for show, you have to take care of the problem. Your veterinarian gave you a list of treatment options for your lamb. You narrow it down to option A and option B. Being tight on money, you do some research online to find a potential natural remedy, option C. From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 14, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your market lamb. Please refer to the Parasite Chart to help make your decision.

Dairy Cow: Flukes

You are in a dairy cow club and started to raise a 12-month-old dairy cow. Now it is 36 months old and ready to be shown. You have been busy with summer school so you haven't had much time to spend with your dairy cow. Luckily summer school was ending soon so you were going to have more time to spend and prepare your dairy cow for the show. On July 14 you finally got to spend quality time with your dairy cow. The first thing you noticed was she seemed to not want to eat very much. Within a few days you started noticing some weight loss and that she started having diarrhea. The diarrhea continued to persist and your cow started producing less milk.

Worried, you asked your veterinarian to come to your farm on July 15. Your veterinarian examined your dairy cow, did some tests, and concluded that your cow has flukes. In order to treat flukes and maintain the health of your dairy cow for the show, you have to take care of the problem. Your veterinarian gave you a list of treatment options for your dairy cow. You narrow it down to option A and option B. You research online and find that you can also use a natural remedy, option C. From these three possible treatment options, you must decide how you are going to treat your animal. Pick a treatment to start on July 15, describe why you chose that particular treatment, and what effect, if any, it will have on how you show your dairy cow. Please refer to the Parasite Chart to help make your decision.

PARASITE CHART

Affected animals	Parasite	Symptoms	Treatment option	Treatment period	Withdrawal period	Type*	Regimen	Contraindications/ restrictions	Cost†
Beef	Lice	· Scratching · Raw/bleeding skin due to excessive scratching · Fatigue · Anemia	*Option A*	2 treatments over the course of 16 days	0 days	Off label	· Spray onto entire body once per treatment day.	None	$
			Option B	1 day	3 days	FDA approved	· Spray onto entire body once a day.	Do not treat sick or stressed animals.	$$
			Option C	7 days	0 days	Natural remedy	· Rub a thin layer on entire body once a day.	None	$
Beef	Coccidiosis	· Bloody diarrhea · Dehydration · Weight loss · Loss of appetite · Loss of muscular coordination · Loss of balance · Seizures · Poor growth	*Option A*	4 days	10 days	FDA & EPA approved	· Give 1 tablet orally once a day.	Do not use on lactating animals.	$$$
			Option B	21 days	0 days	FDA approved	· Give with water once a day.	None	$$
			Option C	10 days	0 days	Natural remedy	· Give orally twice a day.	Do not give to animals receiving other antibiotics. Allergic symptoms may occur, so discontinue use if symptoms are present.	$$
Swine	Mange mites	· Itching · Lesions on affected areas · Raw/bleeding skin due to excessive scratching · Hair loss	*Option A*	2 treatments over the course of 6 days	18 days	Off label	· Single subcutaneous injection	None	$$
			Option B	2 treatments over the course of 2 days	24 days	FDA approved	· Single intramuscular injection	None	$$$
			Option C	14 days	0 days	Natural remedy	· Apply on entire body 2 to 3 times a day.	None	$
Swine	Lungworm	· Coughing · Labored breathing · Loss of appetite · Pneumonia	*Option A*	3 days	0 days	Off label	· Administer in feed once a day.	Should not be used in animals with known hypersensitivity or allergy to the drug.	$$
			Option B	8 days	9 days	FDA approved	· Administer orally once a day.	None	$
			Option C	9 days	0 days	Natural remedy	· Administer orally twice a day.	None	$$$

Affected animals	Parasite	Symptoms	Treatment option	Treatment period	Withdrawal period	Type*	Regimen	Contraindications/ restrictions	Cost†
Sheep	Lice	• Itching • Lesions on affected areas • Raw/bleeding skin due to excessive scratching • Weight loss	*Option A*	2 treatments over the course of 5 days	0 days	FDA & EPA approved	• Dust evenly over entire body once per treatment day.	None	$
			Option B	1 day	14 days	FDA approved	• Spray once on entire body.	None	$$$
			Option C	1 day	0 days	Natural remedy	• Saturate entire wool once with water.	Kills only active adult lice.	$
Sheep	Haemonchus	• Loss of large quantities of blood and proteins • Weakness • Anemia • Pale gums • Pale lining of the eyelids • Weight loss • Brittle wool • Wool loss • Diarrhea	*Option A*	14 days	10 days	Off label	• Administer in feed once a day.	None	$
			Option B	6 days	30 days	FDA approved	• Administer drench twice a day for 16 days.	Treat at 2-week intervals. High doses can cause toxemia in ewes. Safe for use during pregnancy.	$$$
			Option C	5 days	17 days	Natural remedy	• Give orally once a day.	Do not dose lactating animals whose milk or milk products are intended for human consumption.	$
Dairy cows	Flukes	• Loss in body condition • Decreased milk yield • Decreased fertility • Diarrhea • Decreased appetite • Decreased weight gain • Impaired ability for body to convert feed into body mass	*Option A*	1 day	35 days	FDA approved	• One subcutaneous injection	None	$$$
			Option B	10 days	28 days	FDA approved	• Give orally once a day.	None	$
			Option C	21 days	0 days	Natural remedy	• Give orally once a day, through dropper or in a controlled drinking source.	None	$$

†Cost: $ = Not expensive; $$ = Moderately expensive; $$$ = Very expensive

*Type: FDA approved = Safe and effective treatment according to the US Food and Drug Administration (FDA), when used as directed by the label;
EPA approved = Approved within the standards and regulations of the US Environmental Protection Agency (EPA);
Off label = A drug that is used otherwise than as directed by the FDA-approved label;
Natural remedy = An approach to treatment of a disease or illness that does not involve the use of a drug.

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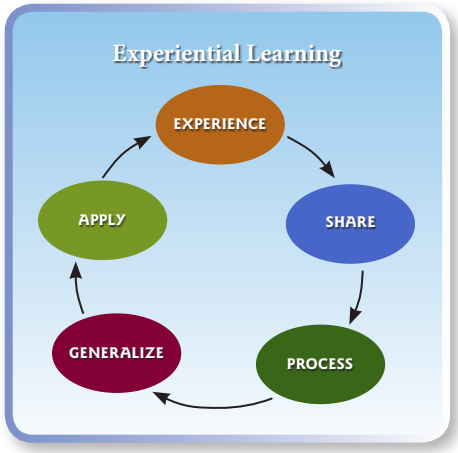
APPENDIX

The activities in this curriculum were designed around inquiry and experiential learning. Inquiry is a learner-centered approach in which individuals are problem solvers investigating questions through active engagement, observing and manipulating objects and phenomena, and acquiring or discovering knowledge. Experiential learning (EL) is a foundational educational strategy used in 4-H. In it, the learner has an experience phase of engagement in an activity, a reflection phase in which observations and reactions are shared and discussed, and an application phase in which new knowledge and skills are applied to a real-life setting. In 4-H, an EL model that uses a five-step learning cycle is most commonly used. These five steps—Experiencing, Sharing, Processing, Generalizing, and Application—are part of a recurring process that helps build learner understanding over time.



For more information on inquiry, EL, and the five-step learning cycle, please visit the University of California Science, Technology, and Environmental Literacy Workgroup's Experiential Learning website, www.experientiallearning.ucdavis.edu/default.shtml.

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