

Colorado Agriscience Curriculum

Section	Animal Science
Unit	Unit 6: Animal Health
Lesson	Lesson 7: Administering Medications

Ag Ed Standards

Standard AGS 11/12.1 The student will demonstrate/communicate an understanding of current issues relating to Agriscience.

Enabler AGS 11/12.1.1-7 All apply

Standard AGS 11/12.2 The student will gain practical experience in Agriscience through laboratory and field work.

Enabler AGS 11/12.2.18 Control Parasites in livestock

Enabler AGS 11/12.2.19 Recognize and Control Disease in Livestock

Standard AGS 11/12.3 The student will demonstrate an understanding of physiological processes in agriculturally important animals.

Enabler AGS 11/12.3.34 Calculate dosages of medications

Colorado Science Standards

Standard SCI 3.0 Life Science: Students know and understand the characteristics and structure of living things, the processes and life, and how living things interact with each other and their environment.

Competency SCI 3.3.3: Explaining human body functions in terms of interacting organ systems composed of specialized structures that maintain or restore health.

Competency 3.3.4: Students compare and contrast characteristics of and treatments for various types of medical problems.

Student Learning Objectives

As a result of this lesson, the student will ...

1. Understand the different methods of administering medications
2. Calculate dosages of medications and read labels

3. Understand the Meat Quality Assurance Program

Time: Instruction time for this lesson: 50 minutes.

Resources:

- Infovets CD—Small Ruminant
- Infovets CD—Beef Cattle
- Introduction to Livestock and Companion Animals, Lee et al.
- <http://www.bqa.org/>

Tools, Equipment, and Supplies

- White board/overhead projector
- Copy of assessment—one for each student
- Oranges—1/2 the number of students in the class plus one extra for demonstration
- Blue food coloring (3 different colors of dyes can be used to show the different injections. Use blue, green, and brown)
- Needles and syringes (injection type specific is recommended)
- Paper for writing notes
- Copy of Label Reading worksheets—one for each student
- If using an overhead projector, a copy of the sheet titled “Label Practice”

Key Terms. The following terms are presented in this lesson and appear in bold italics:

Intradermal

Intravenous

Intraperitoneal

Topical medication

Bolus

Intramuscular

Intranasal

Intramammary

Oral medication

BQA (Beef Quality Assurance)

Interest Approach

*As the class walks in the room, show the first seven slides of the accompanying PowerPoint. Encourage students to look at the illustrations and attempt to tell you **how** to treat the animals. Try to drive home the point that all of them need some sort of medication to improve their condition.*

How are we going to treat these animals? _____, do you have a solution for any of their problems? How are we going to keep them as productive members of our herd? Where do we start? The answer is we need to begin with a treatment program and in order to do that, we need to know how to administer medications. Are all medications given the same way? We are going to spend the rest of class today learning about various methods of administering medications, how to read labels, and what the livestock industry expects from producers so that both parties will make a profit and that we can continue to have the consumers confidence that they are receiving a safe product.

Summary of Content and Teaching Strategies

Objective 1. UNDERSTAND THE DIFFERENT METHODS OF ADMINISTERING MEDICATIONS

There are numerous ways to treat that sick animal we just talked about. Are we going to use a tiny needle with a 50 mL syringe on a cow? Are we going to inject penicillin orally? How do we know what to do? The answer is that we need to know how to read a medicine bottle, which should tell us how to inject the medication. We will learn how to actually give the medicine in a few minutes, but first let's learn the different options.

There are a number of ways to inject animals, which you need to add to your notes.

I. Methods of administering medications

1. **Intradermal:** Injection made into the skin.
2. **Subcutaneous (SQ):** Injection made just beneath the skin.
3. **Intramuscular (IM):** Injection made into the muscle.
4. **Intravenous (IV):** Injection made in the veins of an animal.
5. **Intranasal (IN):** Injection given through the nose, often sprayed into nostrils.
6. **Intraperitoneal:** Made into the body cavity, usually into the hollow of the flank.
Used when a quick response is needed.
7. **Intramammary:** Made in the udder through opening in the teats.
8. **Topical Medication:** Placed on skin or surface area of skin, such as back-scratchers or pour-ons.
9. **Oral Medication:** Through the mouth, in liquid, bolus, or additive in feed
10. **Bolus:** a large pill that is giving with a tool called a balling gun.

Put students into pairs based on the color of shirt they are wearing. Have a table set up with oranges, syringes, and needles. Have one centralized container of water with blue food coloring. From that, they will take the amount of "medication" needed for the injection and put it into the orange per your directions.

Are we all professionals now? Is everyone ready to be veterinarian for a day and give some injections? Maybe we're not quite professionals, but we have to start somewhere! When I say "orange", send one person from your team to the table to pick up one orange, one needle, and one syringe. Then that person will go back to your area. I have a list of tasks and medications we must administer to keep these oranges healthy...are you up for the challenge? I thought so!

While the students are getting the materials, write the following information on the board:

- a. 2 cc intramuscular
- b. 3 cc subcutaneous
- c. 1 cc intradermal

Great job getting just the right tools for the job. Put both hands in the air when you are ready to begin. OK, you can put them down now.

Before you begin, I need to demonstrate a few concepts. Please keep your eyes on me and your hands off our tools!

Perform these tasks as you read these words. *This is a guideline to help you remember the basics.*

Step one: place the needle on the syringe (*be sure to do this with the cap on the needle*)

Step two: Pull back the plunger on the syringe the number of cc's you are going to administer. This prevents too much pressure from building up in our bottle.

Step three: Place end of needle in the "medicine container" and push the air back out of the plunger and into the medicine.

Step four: Pull back on the plunger until you have filled the syringe with the correct cc's for the job.

I need three volunteers. _____, _____, and _____, thanks for volunteering!

I need _____ to demonstrate intramuscular injections without any medication in the syringe. Let's encourage _____ by yelling "Give that injection" when I count to three! 1...2...3!

Student volunteer should put needle directly into the orange flesh.

I need _____ to demonstrate intradermal injections. Let's encourage _____ by yelling "Go, doctor, go" when I count to three! 1...2...3!

Student volunteer should carefully put needle into the skin layer of the orange.

I need _____ to demonstrate subcutaneous injections. Let's encourage _____ by yelling "ready, set, go" when I count to three! 1...2...3!

Student volunteer should put needle directly below skin of the orange but not deeply into the flesh. Explain that gauges and lengths of needles are used depending on the type of injection.

Great job volunteers! On three, let me hear a loud "way to go" from everyone!

I believe we are now ready to give the oranges the medicine. When I say "inject", you and your partner will have six minutes to give the injections listed on the board. I am keeping track of your procedure so do a great job! "Inject"!

Allow students six minutes to finish dosing the oranges. Collect materials from students to be sure they don't poke each other. If different dies are used, take apart the oranges and view the

different injections and to see if they hit the target!

Objective 2. CALCULATE DOSAGES OF MEDICATIONS AND READING LABELS

Be ready with the handout called “Example label” Give the students two minutes to read and analyze the information. If possible bring in actual labels from a medication. Ask the vet or a producer to save the packages for you. Scan the label and project it instead of the one in the PowerPoint!

Now that we know all the different ways to administer medications, how do we know which is right? The answer is that we need to know how to read a label. Each medication that is given to an animal should have a label that tells us what the common name of the medication is, what species it is intended for, how it is administered, any health risks associated with the medication, what it is for, and how much to give the animal. I am projecting an image of a label for you to analyze. When I say “analyze”, you will have two minutes to read over the label and become comfortable with the information. When the two minutes is up, we will analyze the information together.

Ready, set, analyze!

Great job readers...give yourselves a hand!

Go through the following questions and answers verbally. Point out the location of the information as you go. Allow students to answer questions as called upon. The answers are printed below for your convenience.

I have a series of questions that I need answered from my expert panel of judges, which is you!

1. What is the common name of the medication?
2. What species is this medication given to?
3. How is this given to the animal?
4. One should give this medication _____ml per _____?
5. How much should we give a feeder pig weighing 80 pounds?

1. Ivomec
2. swine
3. subcutaneously
4. ½ ml per 38 pounds of bodyweight
5. 1 ml

Pass out worksheets called “Practice Labels”

Outstanding job! I have some practice labels for you to read. When I say “let’s do it”, your job will be to analyze the labels and answer the questions in the next ten minutes. When you are done I will collect them from you. “Let’s do it!”

Objective 3. THE STUDENT WILL UNDERSTAND THE MEAT QUALITY ASSURANCE PROGRAMS

Why do we even care about where or even how we give shots to animals? Does it really matter? Once it's in the body, isn't it all the same?

Choose one student to answer the following question, hopefully one that shows market animals at fair.

_____, what do you think are the most valuable parts of the steer you raised for fair this year. Was it his head, his shoulder, his belly, his rump, or his tail-head?

Take answer from student and if right, give the following compliment.

Outstanding job _____. The answer is his rump is the most valuable from the list in terms of carcass merit. When his carcass is processed, there are some very valuable sections, or primal cuts, that come from the rump. Therefore, you and I can't afford to give him intramuscular shots in the rump because the bruising from the shot will cause a decrease in the value of a carcass.

PowerPoint slide on beef quality assurance.

Capture the following items in your notes. These are suggestions from the Beef Quality Assurance Program, which encourages producers to follow certain guidelines to produce the best quality meat for the consumer.

II. Treatment records will be maintained with the following recorded:

1. Individual animal or group identification
2. Date treated
3. Product administered and manufacture's lot/serial number
4. Dosage used
5. Route and location of administration
6. Earliest date animal will have cleared withdrawal period

III. Injectable animal health products:

1. Products labeled for subcutaneous (SQ) administration should be administered SQ in the neck region (ahead of the shoulders).
2. All products labeled for intra-muscular (IM) use shall be given in the neck region only (no exceptions, regardless of age).
3. All products cause tissue damage when injected IM. Therefore all IM use should be avoided if possible.
4. Products cleared for SQ, IV or oral administration are recommended.
5. Products with low dosage rates are recommended and proper spacing should be followed
6. No more than 10 cc of product is administered per IM injection site.

Info taken from www.bqa.org

Review/Summary.

Use a Marcel Marceau Moment to have the students' mime the different ways of administering medications. Create a mime in each group of two or three students, where that student will be the mime and other member(s) will guess the type of injection or other administration. Encourage them to use facial expression, body movements, and invisible props. At the end of the activity, have a "mime time" where each mime can present their best performances in front of the class.

Application

Extended classroom activity:

Travel to meat packer (local or large corporation) to view injection sites on carcasses. Have students estimate value of carcass lost to injection sites.

Bring in livestock to demonstrate methods of administering medications, including injections. Have students practice on those animals needed scheduled vaccines or other medications.

FFA activity:

Have a speaker present the Quality Assurance Program to members during a meeting.

SAE activity:

Have students with animal production SAE's attend an evening Quality Assurance Program.

Evaluation.

Assessment

Answers to Assessment:

1. I
2. C
3. F
4. J
5. A
6. G
7. D
8. B
9. H
10. E

Answers to Label Reading:

Example A

1. Lutalyse
2. Estrus synchronization
3. beef cattle
4. Intramuscular
5. 6 doses (30 mL divided by 5 mL dose)

Example B

1. Swine
2. Dectomax
3. Intramuscular
4. One
5. four ($300 / 75 = 4$)

Assessment

Name:

Date:

Matching: Complete questions 1-10 by matching the correct term with the correct definition

1. _____ **Intradermal:**

2. _____ **Subcutaneous (SQ):**

3. _____ **Intramuscular (IM):**

4. _____ **Intravenous (IV):**

5. _____ **Intranasal (IN):**

6. _____ **Intraperitoneal:**

7. _____ **Intramammary:**

8. _____ **Topical Medication:**

9. _____ **Oral Medication:**

10. _____ **Bolus:**

A. Injection given through the nose, often sprayed into nostrils.

B. Placed on skin or surface area of skin, such as backrubbers or pour-ons.

C. Injection made just beneath the skin.

D. Made in the udder through opening in the teats.

E. A large pill that is given with a tool called a balling gun.

F. Injection made into the muscle.

G. Made into the body cavity, usually into the hollow of the flank. Used when a quick response is needed.

H. Through the mouth, in liquid, pill, bolus, or additive in feed

I. Injection made into the skin.

J. Injection made in the veins of an animal.

Name:

Read each of the following labels to determine the answers to the following questions.

EXAMPLE A
THIS IS A PRODUCT OF PFIZER ANIMAL PRODUCTS

LUTALYSE®
(dinoprost tromethamine)
Sterile Solution

Leading the World in Reproduction

LUTALYSE® (dinoprost tromethamine) Sterile Solution is the premium choice for reproductive management in all beef operations. It helps cow-calf operators synchronize estrus for shorter breeding seasons and earlier, more uniform calves. It can also help feedlots make sure they're feeding open heifers.

Indications

In beef cattle with a corpus luteum, LUTALYSE® Sterile Solution is indicated for the following:

- Estrus synchronization
- Treatment of unobserved (silent) estrus
- Termination of pregnancy
- Postpartum treatment of pyometra (chronic endometritis)

Packaging

LUTALYSE Sterile Solution is available in 30-mL vials.

Dosage/Administration

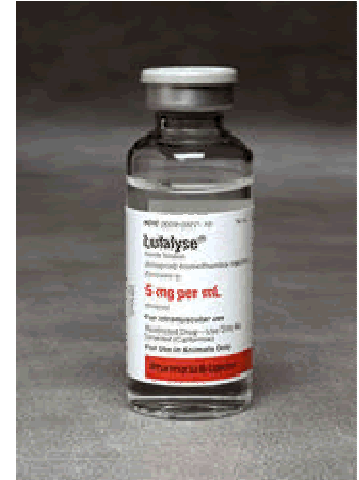
Effective in animals having a functional corpus luteum in the following applications:

- **For estrus synchronization**, inject 5 mL LUTALYSE intramuscularly (IM) either once or twice at 10- to 12-day intervals.
- **For treatment of unobserved estrus**, inject a 5 mL dose IM. If estrus has not been observed by 80 hours after injection, breed at 80 hours; if the cow returns to estrus, breed at the usual time relative to estrus.
- **For termination of pregnancy**, inject a 5mL dose IM.
- **For postpartum treatment of pyometra**, inject a dose of 5 mL IM at signs of pyometra (presence of a corpus luteum on the ovary and uterine horns containing fluid but not a conceptus based on palpation).

When using LUTALYSE, as with all parenteral products, aseptic technique should be used to reduce the possibility of post-injection bacterial infections. Do not administer LUTALYSE in pregnant animals unless cessation of pregnancy is desired. Not for intravenous administration. Women of childbearing age and persons with respiratory problems should exercise extreme caution when handling LUTALYSE.

Federal law restricts this drug to use by or on order of a licensed veterinarian.

1. What is the common name of this product?
2. What is the purpose of this product?
3. What species is this product used on?
4. How is this substance injected...which method?
5. How many doses are available in this vial?



EXAMPLE B
THIS IS A PRODUCT OF PFIZER ANIMAL PRODUCTS

DECTOMAX® Injectable Solution **(doramectin)** **Injectable**

Description :

DECTOMAX® Injectable Solution is a ready-to-use, colorless-to-pale yellow, sterile solution containing 1% w/v doramectin (10 mg/mL). In swine, DECTOMAX is formulated to deliver the recommended dosage (300 mcg/kg of body weight) when given by IM injection at the rate of 1 mL/75 lb of body weight.



Approved Uses

DECTOMAX Injectable Solution is approved for:

- The treatment and control of internal and external parasites of swine.
- It is safe for the use in swine of all ages, including breeding stock.
- The treatment and control of the following species of gastrointestinal roundworms, lungworms, kidney worms, lice and mange mites. Consult your veterinarian for assistance in the diagnosis, treatment, and control of parasitism.

Gastrointestinal Roundworms (adults and fourth-stage larvae)

Lungworms (adults)

Metastrongylus spp.

Kidney Worms (adults)

Stephanurus dentatus

Mange Mites (adults and immature stages)

Sarcoptes scabiei var. *suis*

Sucking Lice (adults and immature stages)

Haematopinus suis

Dosage and Administration

Administer DECTOMAX Injectable Solution at the recommended dosage of 300 mg doramectin per kilogram (136 mg/lb) of body weight by intramuscular injection. Each mL contains 10 mg of doramectin, sufficient to treat 75 lb (34 kg) of body weight.

Injections should be given via the intramuscular route. Inject the neck region using an 18 gauge X 1" needle for young animals; a 16 gauge X 11.2" needle for sows and boars. To accurately meter doses administered to piglets, use of a tuberculin syringe and 20 gauge X 1" needle is recommended.

1. What species of livestock is this intended to be used on?
2. What is the common name of the product?
3. How is this injection given?
4. An animal that weighs 74 pounds should receive how many mL's?
5. How many mL's should a 300 lb. sow receive?