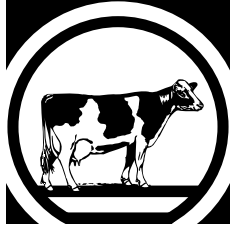


Kansas 4-H Dairy Cattle Leader Notebook

Level III

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Advancing in the Dairy Cattle Project by Reaching Goals

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- To set goals for their dairy project
- To explore various areas for dairy projects

ABOUT THEMSELVES:

- Understanding the importance of overcoming barriers

Materials Needed:

- Flip chart and markers or chalkboard and chalk
- Dairy Cattle Member Guide and Annual Report (MG-38)
- Activity Sheet 1, Barriers to Reaching My Goals (Two copies)

ACTIVITY TIME NEEDED: 40 MINUTES

ACTIVITY

Leader Notes

As you become older you can branch out into a variety of areas related to the dairy project. This lesson is prepared to guide members into different areas of interest through a goal-setting process.

Some lesson suggestions might be:

- Studying the ruminant digestive system
- Knowing your animal's normal temperature
- Taking a hay sample
- What is in a pedigree
- Understanding a milking system
- Learning to keep milk production records

Goal setting

After having had time to discuss the topics listed, it is time to set some learning goals for the year. Fill out your Dairy Member Guide and Annual Report, for MAP steps 1 to 3.

Let's think about possible barriers that might prevent us from reaching our goals.

Barriers

It is important to know how to cope with and eliminate barriers that might stop you from reaching your goals. Some major barriers to reaching goals can include time, money, resources, knowledge or ability.

Ask the members what different things they would like to learn about dairy science. List these on the board. Other topics could be listed from Level III Table of Contents. Briefly discuss all items listed.

Handout Dairy Cattle Member Guide and Annual Report, MG-38.

Leader Notes

In groups of two or three members, fill out question 1 on Activity Sheet 1, Barriers to Reaching My Goals.

In groups of two or three members, fill out question 2 on Activity Sheet 1, Barriers to Reaching My Goals.

ACTIVITY

Complete question one on Activity Sheet 1, Barriers to Reaching My Goals.

The best way to deal with barriers is to design strategies of how you will overcome the barrier.

For each step that you've listed on your Dairy Member Guide and Annual Report, identify a barrier that you think could possibly prevent you from reaching your goal.

Now discuss with two or three group members some ways of overcoming those barriers in question 3 on the activity sheet.

For question 4 on the activity sheet, identify what you think will be the biggest barrier you will encounter this year and how you plan to overcome it.

Now, using your Dairy Member Guide and Annual Report, complete MAP STEPS 4–7. Use a second copy of Activity Sheet 1, Barriers to Reaching My Goals, to analyze your second major goal.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What is a barrier to reaching goals that has to do with time?
2. What is a barrier to reaching goals that has to do with money?

Process:

3. Why is it important to know possible barriers that might prevent you from reaching your goals?
4. How will you overcome barriers that prevent you from reaching your goals?

Generalize:

5. What frustrations occurred when you discussed barriers? Why?
6. How do you deal with frustrations that result from working with barriers?

Apply:

7. What are some barriers that you may face in the future?

GOING FURTHER:

- Teach this goal-setting process to other 4-H members or groups.

REFERENCES:

Author:

Clarence W. Linsey, Kansas State Rabbit Breeders Association
James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas
State University

Reviewed by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State
University

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**ADVANCING IN THE DAIRY CATTLE PROJECT BY REACHING GOALS
DAIRY CATTLE, LEVEL III**

Activity Sheet 1, Barriers to Reaching My Goals

1. **BARRIER:** What might be a barrier to reaching a goal that could include:

time? _____ knowledge? _____

money? _____ ability? _____

resources? _____ other barriers? _____

2. **OVERCOMING BARRIERS:** What are some barriers that you might encounter when reaching your goals? (For MAP STEP 2)

Barrier 1: _____ Barrier 4: _____

Barrier 2: _____ Barrier 5: _____

Barrier 3: _____

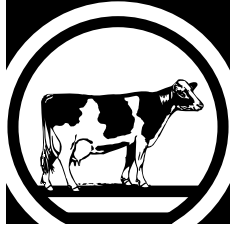
3. **STRATEGIES FOR OVERCOMING BARRIERS:** How will you overcome the barriers that might prevent you from reaching your goal? (For MAP STEP 2)

Strategy 1: _____ Strategy 4: _____

Strategy 2: _____ Strategy 5: _____

Strategy 3: _____

4. **YOUR PRIMARY BARRIER:** What do you think will be your biggest barrier to overcome during the next year for your dairy project and how do you plan to overcome it?



Introduction to Giving Oral Reasons

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The definition of oral reasons
- Terminology used in dairy cattle reasons
- How to take notes during a judging class
- Organizing notes into reasons

ABOUT THEMSELVES:

- How to develop verbal communication skills
- How to improve organizational skills
- Ways to develop self confidence

Materials Needed:

- Member Handout 1, Reasons Terminology for Dairy Cattle
- Member Handout 2, Oral Reasons Note Guide
- Member Handout 3, Oral Reasons Outline
- Chalkboard or writing surface and chalk or marker

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Have you ever heard a judge give reasons for their placing at a dairy show? What do they talk about? Is there a pattern or structure to their comments? What did the pattern seem to be?

Our goal for this lesson is to have each member prepare and give a set of oral reasons to explain or defend why decisions were made to place a class.

As a teaching aid, oral reasons are perhaps the best part of the judging program. Reasons can be very useful for teaching communication skills, organization, self-confidence, and terminology needed to understand selection of animals.

In order to give a set of reasons, members must have:

1. Knowledge of ideal dairy animals.
2. Knowledge of terminology (judging vocabulary).
3. Knowledge of reasons organization.
4. Ability to take good notes.
5. Confidence.

Leader Notes

This lesson may need to be divided into two lessons.

Level III members can begin learning to write and give reasons on dairy cattle classes. This will improve the overall ability to judge dairy cattle.

Note: Young members need to be encouraged to write and read a short set of reasons, but not pressured to memorize and give long sets of reasons. Let members work in pairs to get started.

Information from the lesson on introduction to judging dairy cattle in Level II can be inserted here, if desired.

Leader Notes

ACTIVITY

How can there be three pairs of animals in a class of 4?

1 & 2 - 2 & 3 - 3 & 4

Write example on board:

longer

stronger

deeper

wider

More correct set to legs. Sharper over the withers.

Pass out Member Handout 1, Reasons Terminology for Dairy Cattle.

Show on Chalkboard: Paragraph Sentences

Knowledge of Ideal Dairy Animals

Members need to continue to learn what to look for in judging different classes of dairy cattle. This information will not be taught in this lesson.

Knowledge of Terminology

A. Members **must** know the parts of dairy animals.

B. Members **must** know descriptive and comparative terminology of dairy cattle.

A judging class is made up of four animals. Reasons are given by comparing three pairs of animals: top pair, middle pair, bottom pair and explaining why one animal is better than another.

Most one syllable terms can be used comparatively by placing an “er” ending after the word.

The words “more” or “less” can be used to make comparative terms.

There are many ways to say the same thing. The challenge of reasons is to say the same thing more than once in a set of reasons, but worded such that the reasons do not become repetitious.

Imagine that you are describing the class to a person who has not seen it, mainly by comparing one animal to another.

Knowledge of Reasons Organization

Organization of reasons is a must if all differences are to be discussed in a logical order. Reasons are divided into the following sections:

1. Introduction
2. Top pair paragraph
3. Middle pair paragraph
4. Bottom pair paragraph
5. Bottom individual paragraph

Introduction

The introduction to a set of reasons is always the same except for the name of the class and the placing. Example: for a class of heifer calves placed 4-3-2-1, the introduction should be as follows:

“I placed this class of heifer calves 4-3-2-1.”

Top, Middle and Bottom Paragraphs

The three paragraphs within a set of reasons are all organized in much the same manner. Each paragraph is composed of a series of sentences which compare the two animals in that particular pair.

A. Introduction

- A. The first part of the paragraph is the **introduction** which serves to introduce the paragraph. Continuing the example of the heifer class, the introduction would be, “In regard to my top pair, I placed 4 over 3 because” or “In my top pair I placed 4 over 3 because...”

ACTIVITY

Leader Notes

- B. The next part of the first sentence is the **topic sentence** and should contain the most important factor involved in the placing.”

...because 4 had more size and scale.”

This sentence would leave no doubt in the reason taker’s mind that 4 was larger than 3 and that difference was the most important factor involved in placing that pair of heifers.

- C. The **furthermore sentence** is devoted to the next largest difference between the two animals and our example class might read, “Furthermore, 4 has more dairy character showing more refinement about her head, a cleaner, neater throat, and a longer, cleaner neck.”

C. Furthermore Sentence

Because of the way in which it is said, it is obvious that we feel that 4 has more dairy character. Yet by putting this statement second, we have said differences in dairy character are not as large as differences in size.

- D. The **in addition** sentence may be used alone or along with an also sentence. Whether one or both are used depends on whether the remaining differences between the animals are large enough to justify the use of both sentences. Assuming in the class of heifers, number 4 is an easy top, these sentences might read:

D. In Addition Sentence

“In addition 4 was stronger in her top line and had more width through her rump when viewed from behind.”

- E. Next is the **grant sentence**. The grant sentence admits that the lower placed animal in the pair has some traits superior to the higher placed animal. The grant sentence may well be the most important sentence in the paragraph, particularly in a close placing where the member may have switched the pair.

E. Grant Sentence

If the differences or points in which the bottom animal in a pair was superior are all brought out and the reason taker realizes that the member saw the difference, but simply switched the pair, he or she may not take off many points. On the other hand, if the member switched the pair and had no grant sentence or a very weak one, then the reason taker might take off more points.

A well worded grant sentence is essential. In the heifer class, the pair was not close and the grant sentence may read: “I grant, however, that 3 had a more correct set to her hocks.”

- F. The last sentence is the **criticize sentence**. This sentence is important because if there is a fault in the second animal it should be brought out. In the heifer class the criticize sentence might read: “I criticize 3 for lacking the scale of 4.”

F. Criticize Sentence

Leader Notes

ACTIVITY

If all of the sentences are put together, the top paragraph would read:

“...In my top pair, I placed 4 over 3 **because** 4 had more size and scale. **Furthermore**, 4 has more dairy character showing more refinement about her head, a cleaner, neater throat, and a longer, cleaner neck. **In addition** 4 was stronger in her top line and had more width through her rump when viewed from behind. **I grant**, however, that 3 had a more correct set to her hocks. However, I criticize 3 for lacking the scale of 4.”

The paragraphs pertaining to the middle and bottom pair are composed in the same manner as the top paragraph except with different introductory statements. The introduction of these two paragraphs might read:

“In my middle pair, I placed 3 over 2, because”

“In regard to my bottom pair, I placed 2 over 1 because...”

After having finished the discussion of the top, middle, and bottom pairs, all that remains is a description of the bottom individual and the closing statement.

The Bottom Individual Paragraph

If the bottom animal was an easy last place and grants over the third place animal are very minimal, then the last place animal should be criticized to let the judge know you really saw the animal. Remember that, although they might be hard to find, all animals have some strong points. A typical bottom individual paragraph might read:

“Realizing 1 had adequate size, I nonetheless fault her and leave her at the bottom of the class because she was a low set, coarse heifer which lacked dairy character.

Taking Notes

Taking good notes is almost as important as terminology in giving reasons. This note taking guide has been found to be useful for taking notes in classes. The important thing is to take notes one can read and understand later, sometimes hours later, when preparing reasons.

In taking notes, one should take a mental photograph of the class and take notes so that this photo is recalled when actually preparing the reasons. It is a good practice to use abbreviations when taking notes. Make sure the abbreviations are clear and easy to understand. There is nothing as frustrating as not being able to remember what an abbreviation stands for when trying to prepare a set of reasons.

Now we will use this information in preparing a set of reasons.

Pass out Member Handout 2, Oral Reasons Note Guide. Let members work in pairs to develop their first set of notes.

Have members decide on some abbreviations they will need to consistently use.

Show class of cows. Have members take notes using a note taking guide. Go over class and help members fill out note taking guide with most important points using correct terminology.

ACTIVITY

Leader Notes

SUMMARY

Continue to learn terminology and develop a thorough knowledge of good dairy cattle characteristics. Practice note taking, writing and reading reasons and eventually giving memorized reasons. This will contribute to a members' success in giving oral reasons.

Pass out Member Handout 3, Oral Reasons Outline and have members write a set of reasons using their notes and correct terminology you have given them.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What has been the easiest thing for you to do in learning oral reasons? The hardest?
2. Why are good notes important?

Ask for volunteers and have a few members read their reasons. Strongly compliment their first efforts. Leave criticizing until later sessions. Learning to take notes on a class and to verbally defend a placing will make members be more skillful evaluators and judges of dairy cattle.

Process:

3. What are you going to need to work on to become good at placing animals and giving reasons? (i.e., notetaking, grammar, oral speaking, techniques, organization)
4. What is the significance of being able to explain and defend a decision?

Compliment examples: "You've done a good job with ..." or "I like the way you ..."

Generalize:

5. Have you had to use similar skills for projects in school? Describe what you did.
6. How will this reasoning process help you make other decisions?

Apply:

7. What are some other areas of your life where you can apply this same organized thinking?

GOING FURTHER:

- Participate in dairy cattle judging practices.
- Participate in dairy judging contests.
- Observe other members giving oral reasons.
- Observe a lawyer or a debate where organized logical thinking is used.

Leader Notes

ACTIVITY

REFERENCES:

Judging Dairy Cattle, Trimberger, Cornell University Press

Authors:

Bill Jackson, Extension 4-H Specialist, Texas

Brian Cummins, County Extension Agent, Texas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Extension Specialist, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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INTRODUCTION TO GIVING ORAL REASONS

DAIRY CATTLE, LEVEL III

Member Handout 1, Reasons Terminology for Dairy Cattle

GENERAL APPEARANCE

Desirable

1. More symmetry, style and balance
2. Smoother and parts well blended
3. Smoother and tighter in the shoulders
4. Stronger in the chine
5. Stronger in the loin
6. Stronger in the back or top line
7. Nearly level from hips or hooks to pins

8. Longer and wider in the rump
9. Higher and wider in the thurls
10. More correct set to the hocks
11. More width between the hocks
12. Stronger, shorter pasterns
13. Deeper in the heels
14. Front legs and feet parallel with the body

Undesirable (Criticisms)

1. Less of symmetry, style, and balance
2. Rougher and parts not as well blended
3. Rougher or more open in the shoulders
4. Weaker in the chine
5. Weaker in the loin
6. Weaker in the back or top line
7. Too sloping from hips or hooks to pins:
pins higher than hips or hooks
8. Shorter and narrower in the rump
9. Lower and narrower in the thurls
10. Too much set or too straight in the hocks
11. Too close between the hocks
12. Longer or weaker pasterns
13. Shallower in the heels
14. Toes out

DAIRY CHARACTER

Desirable

1. More angularity
2. More length, stretch and openness
3. Cleaner and free of excess fleshing
4. Femininity about the head
5. Cleaner in the throat
6. Longer and leaner in the neck
7. Cleaner and more refined in the brisket
8. Cleaner and more refined in the withers
9. Cleaner over the hips and pins
10. Cleaner, flatter thighs
11. Cleaner, flatter bones

Undesirable

1. Less angularity
2. Less length, stretch and openness
3. Coarser, thicker, stale, or over conditioned
4. Coarse and lacking femininity about the head
5. Thicker in the throat
6. Shorter and thick in the neck
7. Thicker and coarser in the brisket
8. Thicker and coarser in the withers
9. Thicker over the hips and pins
10. Thicker in the thighs
11. Coarser bones

INTRODUCTION TO GIVING ORAL REASONS

DAIRY CATTLE, LEVEL III

Member Handout 1, Reasons Terminology for Dairy Cattle, *continued*

BODY CAPACITY

Desirable

1. Deeper in the chest
2. Wider on the floor of the chest
3. Fuller in the crops
4. Deeper in the barrel or rear ribs
5. More spring of rib
6. Deeper in the flank
7. More width through the rump

Undesirable

1. Shallower in the chest
2. Narrower on the floor of the chest
3. Weaker in the crops
4. Shallower in the barrel or rear ribs
5. Less spring of rib
6. Shallower in the flank
7. Narrower through the rump

MAMMARY SYSTEM

Desirable

1. Symmetry and balance
2. Leveler on the floor
3. Strongly and smoothly attached fore udder
4. Strong median suspensory ligament
5. Higher, wider rear udder attachment
6. More capacity of the mammary system
7. More desirable length of teat
8. More desirable teat placement
9. Teats hanging plumb

Undesirable

1. Unbalanced
2. Slopping on the floor
3. Weaker or bulging fore udder attachment
4. Weaker median suspensory ligament
5. Lower, narrower rear udder attachment
6. Less capacity of the mammary system
7. Teats too long
8. Front teats too wide
9. Teats strutting

TRANSITION WORDS FOR ORAL REASONS

Furthermore
Even so
Nevertheless
However
And

Moving to
Therefore
Admit
Grant
Realize

**INTRODUCTION TO GIVING ORAL REASONS
DAIRY CATTLE, LEVEL III
Member Handout 2, Oral Reasons Note Guide**

Class Name _____		
Placing _____		
Compare	Grant	Criticize

INTRODUCTION TO GIVING ORAL REASONS
DAIRY CATTLE, LEVEL III
Member Handout 3, Oral Reasons Outline

I. Introduction

“I placed this class of (*class name*) 4-3-2-1.

II. Top Pair Paragraph

- A. Introductory Sentence
- B. Top Sentence
- C. Furthermore Sentence
- D. In Addition Sentence
- E. Grant Sentence
- F. Criticize Sentence

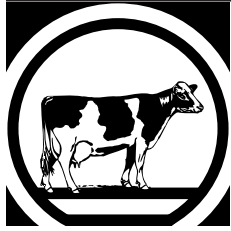
II. Middle Paragraph

- A. Introductory Sentence
- B. Top Sentence
- C. Furthermore Sentence
- D. In Addition Sentence
- E. Grant Sentence
- F. Criticize Sentence

IV. Bottom Pair Paragraph

- A. Introductory Sentence
- B. Top Sentence
- C. Furthermore Sentence
- D. In Addition Sentence
- E. Grant Sentence
- F. Criticize Sentence

IV. Bottom Individual Paragraph



How Much Water?

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- How much water dairy animals require per day
- How to calculate water capacity for various stock tanks.
- Decide if personal stock tanks are adequate for their own animals

ABOUT THEMSELVES:

- The importance of water to themselves
- The various ways they use and need water
- How well they can use math computation skills

Materials Needed:

- Member Handout 4, Figuring Stock Tank Capacities
- Calculators (optional)
- At least one real stock tank for a practice exercise
- Tape measure
- Paper and pencils

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

All animals require water for healthy lives. Knowing how much clean drinking water an animal requires each day will help members determine if stock tanks are adequate to meet animal water requirements.

Ask members to list when and where they use water.

Often, we overlook the importance that water plays in dairy production. A little effort on the part of dairy producers in making water freely available is bound to increase production and therefore income.

Water is the basis of all life and is the most important part of an animal's diet. A dairy animal can go without food a lot longer than it can go without water.

The average person's total use of water is 5 gallons per day! How much water do you think the average dairy animal drinks each day? Is it more than what humans require? Or less?

The answer depends on the size of the animal, but as you can imagine, dairy cattle require much more water than people primarily because they are so much bigger. For example:

Leader Notes

These are rule-of-thumb estimates based on research.

Pass out Member Handout 4, Figuring Stock Tank Capacities.

Use each of the diagrams as samples. Give imaginary dimensions and have members work in pairs to practice calculating water capacity.

Take your group outside. Be sure to bring along tape measures, calculators, paper, and pencils. Let the members work together to figure the capacity of several stock tanks on a farm.
Note: Remind members that water tanks are seldom full and plenty of water must be available.

ACTIVITY

- A 350-pound calf needs between 1 and 5 gallons of drinking water a day. In this case, hauling a 5-gallon bucket of water out to your young animal twice a day might be okay, depending of course on the weather.
- A 500 pound calf needs between 2 and 6 gallons of drinking water a day.
- A 750 pound heifer needs 10 to 15 gallons per day of clean drinking water. At this level, you can easily see one bucket of water twice a day won't quite provide enough water for the animal to be healthy.
- A high producing dairy cow weighing 1,300 pounds or more needs 25 to 35 gallons of cool, clean drinking water.

How much water will five dairy cows need per day? (more than 125 gallons).

Obviously, if your operation depends on stock tanks for providing water to your animals, you need to know if you have tanks large enough to hold an adequate water supply. Let's look at the handout on stock tank capacities.

Look at the way to calculate the water holding capacity of each of the shapes: round, rectangular, curved bottom, slanted side, and "V" sided troughs.

Just for practice, let's assume you have a round stock tank at home that is 8 feet in diameter and 2 feet high. What is the capacity of this tank in gallons? ($4 \times 4 \times 3.14 \times 2 \times 7.46 =$ about 749.6 gallons) How many 500-pound calves could be watered by this tank per day? 750-pound heifers? Full-production cows?

Now, let's go outside to figure out the gallon capacity of some stock tanks.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. How many different shapes of water tanks do you have?
2. Which shape was hardest to figure capacity? Easiest? Why?

Process:

3. What are advantages and disadvantages of various shapes of tanks?
4. Do you think your water system is adequate for your calf?
5. Is there an easier way for you to water your calf than what you already do?

ACTIVITY

Leader Notes

Generalize:

6. How else do you use water in daily living?
7. Are there other ways you can use these same math computations?

Apply:

8. How can you compute your daily water needs?
9. How can you use the math formulas in this lesson in other areas of your life?

GOING FURTHER:

- Check with the Farm Service Agency or an engineering contractor to find out how to figure capacity of farm ponds.
- Go home and do the same computations on the stock tanks or ponds. See if they are providing enough readily available water for the animals. If not, what size and how many tanks might be need? What will be the cost of purchasing these stock tanks?

REFERENCES:

Author:

Kirk A. Astroth, Extension Specialist, 4-H Youth Programs, Montana State University

Edited by and Reviewed by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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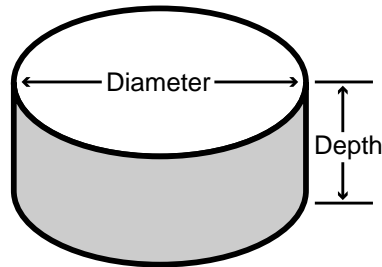
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**HOW MUCH WATER?
DAIRY CATTLE, LEVEL III
Member Handout 4, Figuring Stock Tank Capacities**

Round or Circular Tank

To find capacity in gallons:

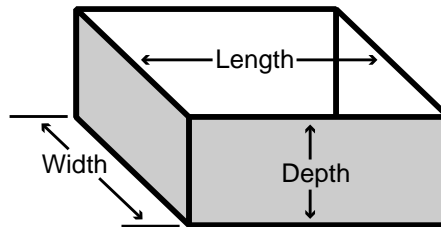
$$\text{radius} \times \text{radius} \times \text{depth} \times 3.14 \times 7.46 = \text{gallons}$$



Rectangular Tank or Trough

To find capacity in gallons:

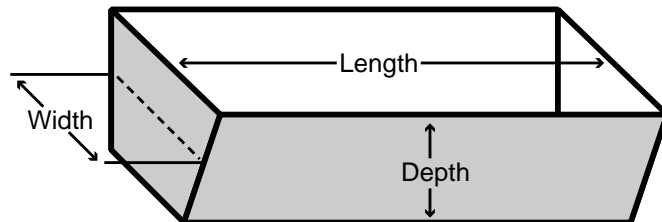
$$\text{length} \times \text{width} \times \text{depth} \times 7.46 = \text{gallons}$$



Slanting Sides Trough

To find capacity in gallons:

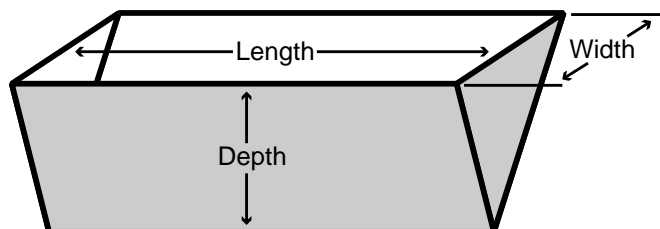
$$\text{width (measure at half depth)} \\ \times \text{length} \times 7.46 = \text{gallons}$$

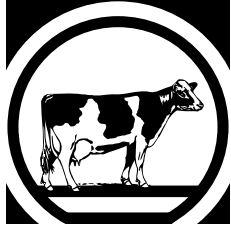


V-Sided Trough

To find capacity in gallons:

$$\text{width} \times \text{depth} \times \text{length} \times 3.73 = \text{gallons}$$





Feed Nutrients and Their Uses

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The six nutrients required by dairy animals
- The function and importance of these six nutrients
- Name and recognize feeds as a source of these nutrients

ABOUT THEMSELVES:

- The relationship of nutrients in their own diet

Materials Needed:

- One empty paper feed sack
- Six 4" × 10" poster cards (nutrient cards—labeled as Water, Carbohydrates, Fats, Proteins, Minerals, Vitamins)
- One felt marker
- Pencils
- Activity Sheet 2, Nutrient Puzzle
- Leader's Key, Activity Sheet 2, Nutrient Puzzle

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Man has long been aware of the importance of the proper kinds of food for survival for himself and his animals. The dairy project member must have a knowledge of the nutrients required by animals for maintenance, growth, milk production and reproduction since good nutrition is the basis of efficient milk production.

What is a nutrient? A nutrient is defined as a "chemical element or compound that aids in the support of life. "Any food or group of foods that support animal life contains nutrients. There are six (6) basic nutrients for dairy cattle. Some nutrients are needed in large amounts while others are needed in only small amounts. Each nutrient is used to do different jobs in the body. These nutrients must be included in a dairy animal's ration to have a balanced ration.

Nutrients are what we feed our cattle, so let's see what is in the "Magic Feed Sack."

Since this is a magic feed sack, I can use my magic skills and fill it with nutrients needed by dairy cattle.

Leader Notes

Have members list as a group what they feel are the six basic nutrients for dairy cattle. Check those listed against the definition.

"The Magic Feed Sack"

Preparation—Before the meeting, place the six 4 × 10-inch nutrient cards (Water; Proteins; Carbohydrates; Fats; Minerals; Vitamins) between the inner layers of the empty feed sack prior to lesson time. Lesson: Show "empty" feed sack to the group. Let individuals see that the inside is empty.

Tap side of sack with hand or pencil.

Leader Notes

Pull out nutrient cards as they are discussed. Discuss basic function or importance of each nutrient and sources.

Protein Card

Carbohydrate Card

Fat Card

ACTIVITY

Now it is full of the nutrients that dairy animals need.

1. **Proteins** are considered the building blocks of the body and are required for muscle growth in young animals, for maintenance of body tissues, and for milk production in lactating animals. Protein can also serve as a source of energy, but protein is usually too costly to be the only source of energy. Therefore only enough protein is fed to adequately satisfy the animals needs.

Protein is formed from amino acids which are composed of nitrogen, carbon, hydrogen, oxygen, and a small amount of sulfur.

Dairy cattle and other ruminants can synthesize all of the amino acids needed. Some of the common protein supplements are plant proteins such as soybean meal and cottonseed meal, and animal proteins such as fish meal, blood meal and dried skim milk.

During digestion, protein is broken down into amino acids (23 kinds of amino acids have been identified) which are carried to all parts of the body in the blood. Protein requirements are actually requirements for amino acids.

2. **Carbohydrates** provide an animal with its major source of energy. Energy is necessary for maintaining body temperature and for activity or work. Excess carbohydrates are stored in the body as fat.

The word carbohydrate is applied to organic chemical compounds which are made up of carbon, hydrogen and oxygen. The group of chemicals classified as carbohydrates are sugars, starches and crude fiber.

Carbohydrates are found in forages and concentrates. In forages, the carbohydrates are a complex type called cellulose. Feed concentrates contain the simple carbohydrates known as starches and sugars. These are found in grains and their by-products, such as corn, oats, barley, wheat and bran.

3. **Fat** acts as an energy source for animals but is only needed in small amounts. In fact, fat can provide $2\frac{1}{4}$ times as much energy as carbohydrates because they are glycerides or fatty acids and are concentrated forms of energy. Fats may be stored in an animal for later energy needs. Stored fat provides protection to the animal's organs.

Fats are rather unstable and if not handled properly can become rancid and spoil rather quickly. Most animals' requirements for fat are less than three percent so fat content is usually not considered in computing rations.

4. **Minerals** are also needed in small amounts. They are necessary for

ACTIVITY**Leader Notes**

bone and teeth (skeleton) growth and maintenance. They are also used in the animal's body in the chemical reactions that are necessary for many life processes. The following minerals have been found to be essential or affect livestock feeding in some manner—calcium, phosphorus, sodium, chlorine, potassium, sulphur, magnesium, iron, iodine, copper, cobalt, zinc, manganese, molybdenum, fluorine, arsenic and selenium.

Minerals Card

5. **Vitamins** are another class of essential nutrients. They are involved in body functions such as vision, blood clotting and bone development. Vitamins are necessary in small amounts to assist in metabolic processes in the animal's body.

Vitamins Card

Vitamins are classified as to their solubility—fat soluble and water soluble. Fat soluble vitamins dissolve in the presence of fat and are not affected by water. Water soluble vitamins dissolve in the presence of water.

There still is one more essential nutrient that is often neglected. Can you name this vital nutrient?

6. **Water** is found in the feed sack as moisture but an additional supply of fresh water must be provided to ensure proper performance. Water is the food nutrient required in the greatest amount. Water acts as a body cleanser and a regulator of body temperature. It carries other nutrients through the body and carries wastes out of the body. It is an active participant in enzymatic reactions. On an average, an adult dairy animal can drink 15 to 30 gallons of water per day, more if it is dry and hot. It is important and essential that fresh water be provided for all animals.

Water Card

Check knowledge about the dairy animal nutrients with the crossword puzzle.

SUMMARY:

The six nutrients, Protein, Carbohydrates, Fats, Minerals, Vitamins and Water are essential for dairy cattle. Other additives may be added to feed rations to improve or stimulate growth, but are not essential. Understanding the importance and function of these nutrients will help in planning rations and feeding properly. A major point to remember is that although a nutritious diet is provided, an inadequate, inconvenient, or poor quality supply will reduce livestock performance.

Pass out Activity Sheet 2, Nutrient Puzzle. Group may also explore practical application of nutrient information to feedings and ration formulation.

Activity to reinforce the information given:

Play "What if."

Ask members to brainstorm what would happen if ... i.e. water was missing from the diet. They should come up with lots of ideas with the major one being death for the animal.

Go on to each of the five remaining nutrients.

DIALOGUE FOR CRITICAL THINKING:**Share:**

1. What are the six nutrients?
2. What nutrients were you the least familiar with?

Leader Notes

ACTIVITY

Process:

3. Based on what you know, which nutrient would have the greatest (fastest) impact on a cow if it were not present?
4. What nutrients are the most important for cattle in terms of amount, type and quality?

Generalize:

5. What nutrients are the most important for you? Why?

Apply:

6. Will you change your daily diet based on what you learned? Why or why not?

GOING FURTHER:

- Research dairy nutrition and prepare an illustrated talk.
- Learn protein requirements for varying ages and kinds of dairy cattle.
- Visit feed stores and compare nutrients available in different feeds.
- Conduct research project with animals by feeding one group more nutrients than the other.
- Give illustrated talk on basic nutrients to members with other animal projects.
- Analyze feeds being used for nutrient content.

REFERENCES:

Feeds and Feeding, Ninth Edition, Frank B. Morrison, Morrison Publishing Company, Ithaca, New York, 1958.

ACTIVITY

Leader Notes

Author:

Jimmy L. Rodgers, County Extension Agent, Texas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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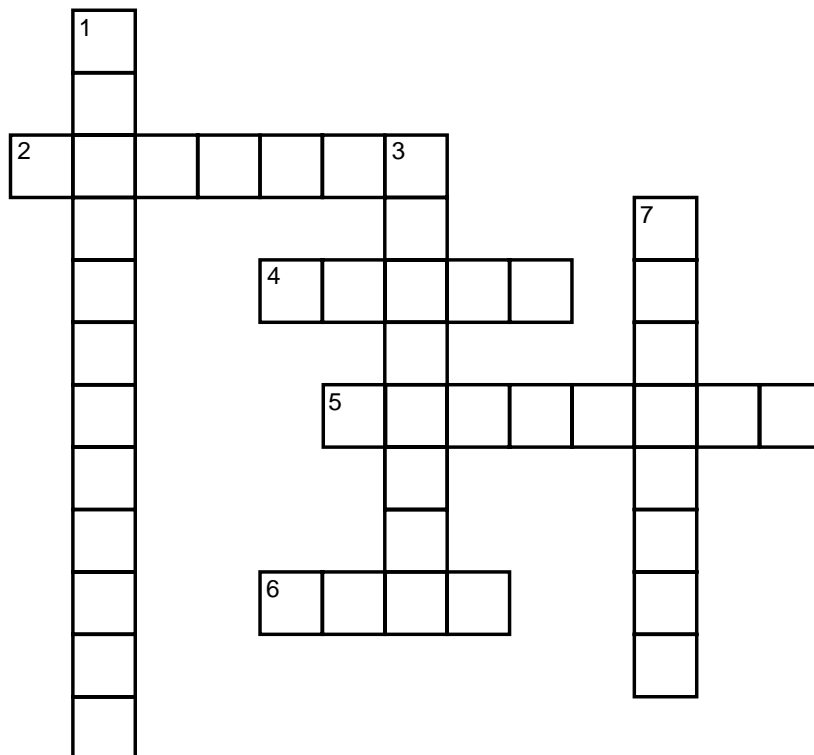
FEED NUTRIENTS AND THEIR USES
DAIRY CATTLE, LEVEL III
Activity Sheet 2, Nutrient Puzzle

ACROSS:

2. Nutrient required for muscle growth
4. Nutrient required in the greatest amount
5. Examples are calcium, phosphorus, and iron
6. An energy source only needed in small amounts

DOWN:

1. The major energy source nutrient
3. A compound that aids in the support of life
7. Only minute amounts are required



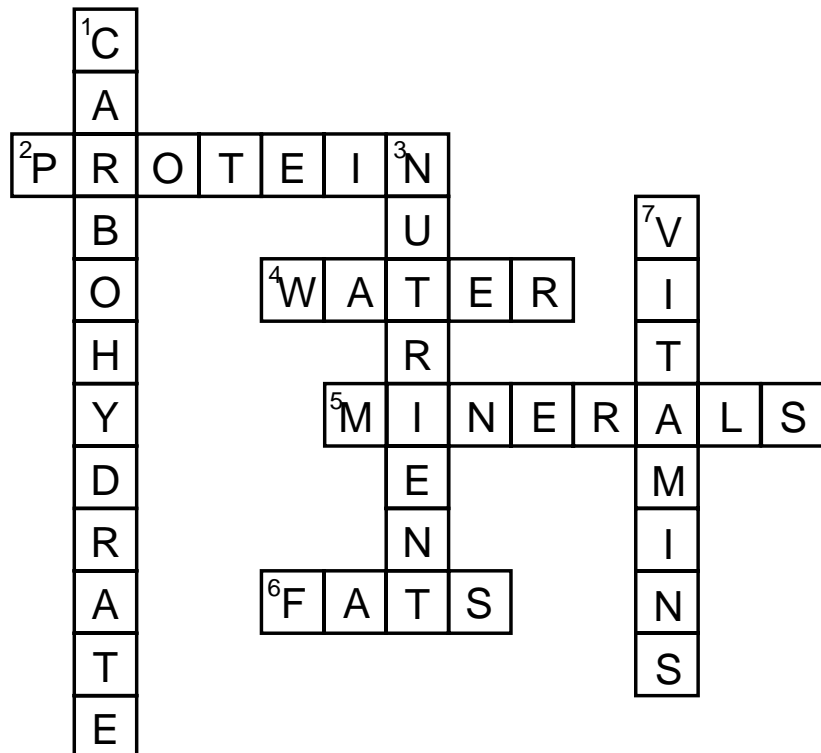
FEED NUTRIENTS AND THEIR USES
DAIRY CATTLE, LEVEL III
Leader's Key, Activity Sheet 2, Nutrient Puzzle

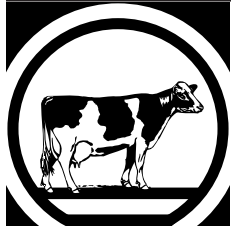
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DOWN:

- 1. The major energy source nutrient
- 3. A compound that aids in the support of life
- 7. Only minute amounts are required





Feed Identification and Classification

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The difference between concentrates and forages
- To identify and classify major feedstuffs
- To list and understand the six major nutrients that should be included in all rations

ABOUT THEMSELVES:

- An appreciation for a diet that is filled with variety
- An understanding of nutrients in their diets

Materials Needed:

- Samples of feedstuffs: corn, oats, grain sorghum, soybean meal, hay, etc. (Include by-products and animal proteins if possible.)
- Sack of feed or have individuals bring in two-pound sample of their project animal's feed
- Six paper plates plus one plate per individual or group (2-3)
- Pencils
- Notecards
- Chalkboard and chalk (optional) or flip chart and marker
- Activity Sheet 3, Feed Classification Word Scramble
- Leader's Key, Activity Sheet 3, Feed Classification Word Scramble

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Let's take a few minutes to identify some common feedstuffs. How many do you know?

Now, let's look at the feed samples that you brought to see how many of the food stuffs are identifiable.

Feed can be classified several ways. One method that is used is based on the fiber and Net Energy Lactation (NEL) content of feed. Using the amount of fiber and amount of NEL as measurements, feed may be classified as concentrates or forages.

1. Concentrates are feeds that have a high percentage of easily digested carbohydrates (high in NEL) and are low in fiber.

Leader Notes

Lesson on "Food Nutrients and their Uses" must be taught before this lesson.

Place samples in numbered containers and give members a card to write the names on.

Display members' feed samples.

Leader Notes

Let members work in pairs to rank these concentrates based on cost, NEL and protein before using the text to discuss and compare.

ACTIVITY

2. Forages, like pasture, hay and silage, are bulky feeds that are high in fiber but low in NEL. Dairy cattle can use forages in rations because they are ruminants, which means they have four compartments to their stomach to help them digest fibrous feeds. Forages are an inexpensive source of carbohydrates for dairy cattle.

CONCENTRATES

Feeds within the concentrate category can be classified. The system of classification is based upon similarities in nutrient composition and feeding value. These categories are grains, by-products, animal proteins, plant proteins, and liquid supplements. Grains are the concentrates with which we are most familiar. They include corn, grain sorghum (milo), oats, barley, and wheat.

1. **Corn** is high in NEL. It is the most widely used feed grain due to its palatability and NEL content. Corn should be cracked or coarsely ground when fed to dairy cattle to increase digestibility. Protein content of corn is fairly constant but slightly lower than grain sorghum.
2. **Grain sorghum** (milo) is considered to be about 90 percent the value of corn. Grain sorghum is similar to corn, but its protein content is more variable and it contains less fat. Since grain sorghum seeds are hard, it needs to be processed thoroughly (cracked, rolled, crimped, ground) to increase digestibility.
3. **Oats** are considered an excellent feed for growing animals due to the high protein and fiber levels, but it is usually more expensive than other grains. Its NEL content varies due to the amount of hulls. Oats usually need to be crimped, ground, or rolled to improve digestibility, except for small calves.
4. **Wheat** has limited use with dairy rations because of its demand for human consumption. Wheat is comparable to corn in NEL value and is about three percent higher in protein. When favorably priced, wheat can be substituted for corn. However, best results are obtained when only a part of the grain in a ration is wheat. Wheat should be coarsely ground or cracked.

The most common types of **By-Products** are wheat midds and animal fat.

1. Wheat midds is produced in the milling of wheat into flour. Midds consist of varying amounts of bran, germ, and flour. It is an excellent source of NEL and protein.
2. **Animal fat** is a by-product of slaughtering and processing plants. It may be used to a limited extent in rations (2-5 percent) as a source of energy and to reduce dustiness.

ACTIVITY**Leader Notes**

Animal Proteins may be used to improve the protein and mineral level of rations. The common animal proteins include: 1) **fish meal**, 2) **blood meal** and 3) **feather meal**. Animal protein levels in dairy rations are usually limited to one or two pounds per day due to palatability.

Plant proteins are the most common supplements in dairy rations. These supplements include soybean meal, cottonseed meal and linseed meal.

1. **Soybean meal** is the most widely used plant protein feed. Most soybean meal contains 44 percent protein.
2. **Cottonseed meal** is an important protein supplement in the cotton production areas. It usually contains 41 percent protein.
3. **Linseed meal** is extracted from flax seed. It contains about 35 percent protein.
4. **Whole cottonseed** is a by-product of the cotton industry and can be used as a protein and energy supplement. Whole cottonseed contains 20 percent protein and 18 percent fat. Due to its fat content, whole cottonseed should be limited to about 6 pounds per day for dairy cows.

Liquid supplements have been used in tanks where dairy cattle have free-choice usage. Usually a molasses-based liquid is used to improve palatability. Molasses is used regularly in rations to increase palatability and improve the consistency of rations. A liquid supplement usually contains molasses and urea (synthetic protein) as a protein source, along with minerals and vitamins.

Forages

1. **Dry forages—Hay** is the most common type of dry forage. Alfalfa hay is high in protein and low in fiber, making it the most desirable dry forage. Prairie, brome, sudan and wheat hays are also popular for heifers and dry cows, but their low protein and high fiber contents limit their usefulness in lactating cow rations.
2. **Green forages** would be those grasses and legumes that are either pastured or green-chopped daily. The easiest and cheapest method of harvesting these forages is to graze them.
3. **Silage** is made from green forages and grain crops, mainly corn, sorghum, and alfalfa, that are cut and stored in silos. While in storage, silage goes through a fermentation process which preserves it.

Other feedstuffs are also used in dairy rations. This lesson only includes some of the major ones.

The value of feeds depends on the amount of protein and energy they contain. Grains are usually slightly higher priced than forages due to their higher nutrient content.

Leader Notes

Have group name/list the six nutrients, from previous lesson and list on flip chart or chalkboard. List the feedstuffs discussed under their primary nutrient source.

Pass out Activity Sheet 3, Word Scramble, as a review to put in their record books. Have small groups discuss each group of words. Use Leader's Key to verify answers.

ACTIVITY

Review six nutrients required by dairy cattle:

Protein
Carbohydrates (energy)
fats and oils (energy)
Minerals
Vitamins
Water

Feed stuffs contain these nutrients in different amounts. The important thing to remember is that these six nutrients are required and come from a combination of different feedstuffs.

SUMMARY

Being able to identify various feedstuffs and knowing their nutrient content is necessary in making decisions concerning the correct rations for various classes of dairy cattle.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What are the differences between concentrates and forages?
2. What are the nutrients all dairy cattle need?

Process:

3. Why is it important to use a combination of concentrates and forages to feed your cattle?
4. What major nutrient requirements are met by concentrates? Forages?
5. How might seasonal weather issues effect nutritional needs of dairy animals?

Generalize:

6. What kinds of foods meet each of the nutrient requirements in your diet?
7. What kinds of food do you have the most trouble including in your diet?

Apply:

8. How will this knowledge of nutrients help you maintain a balanced diet?
9. How important is variety in maintaining an adequate diet?

ACTIVITY

Leader Notes

GOING FURTHER:

- Select one concentrate feed, research its properties and its advantages and disadvantages for dairy cattle.
- Tour a feed mill and observe different feedstuffs being used in feed.
- Identify different feedstuffs in mixed feed.
- Prepare an exhibit with samples of different feedstuffs.
- Tour county and identify various feeds as they are being produced in the field.
- Research other feedstuffs not covered in this lesson.

REFERENCES:

Author:

Jimmy L. Rogers, County Extension Agent, Texas

Edited and reviewed by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

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FEED IDENTIFICATION AND CLASSIFICATION
DAIRY CATTLE, LEVEL III
Activity Sheet 3, Feed Classification Word Scramble

CONCENTRATES

1. Grains:

EAYLRB _____

TSOA _____

ROCN _____

HTAWE _____

2. Processing By-Products:

AWTEH DISM _____

LMAAIN ATF _____

3. Animal Proteins:

SFHI ALME _____

DOLOB MELA _____

4. Plant Proteins:

NYBOSAE LAME _____

DESNILE LEAM _____

DETOCONTES ALME _____

5. Liquid Supplements:

SASESOML _____

AERU _____

FORAGES

1. Dry Forages:

FLAALFA YHA _____

MOBRE HYA _____

2. Green Forages:

ESASRSG _____

EUSMGEL _____

3. Silage:

NROC _____

LFAFALA _____

MHGUROS _____

**FEED IDENTIFICATION AND CLASSIFICATION
DAIRY CATTLE, LEVEL III**

Leader's Key, Activity Sheet 3, Feed Classification Word Scramble

CONCENTRATES

1. Grains:

EAYLRB _____ Barley _____

TSOA _____ Oats _____

ROCN _____ Corn _____

HTAWE _____ Wheat _____

2. Processing By-Products:

AWTEH DISM _____ Wheat Mids _____

LMAAIN ATF _____ Animal Fat _____

3. Animal Proteins:

SFHI ALME _____ Fish Meal _____

DOLOB MELA _____ Blood Meal _____

4. Plant Proteins:

NYBOSAE LAME _____ Soybean Meal _____

DESNILE LEAM _____ Linseed Meal _____

DETOCONTES ALME _____ Cottonseed Meal _____

5. Liquid Supplements:

SASESOML _____ Molasses _____

AERU _____ Urea _____

FORAGES

1. Dry Forages:

FLAALFA YHA _____ Alfalfa Hay _____

MOBRE HYA _____ Brome Hay _____

2. Green Forages:

ESASRSG _____ Grasses _____

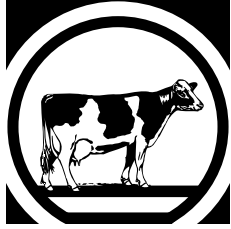
EUSMGEL _____ Legumes _____

3. Silage:

NROC _____ Corn _____

LFAFALA _____ Alfalfa _____

MHGUROS _____ Sorghum _____



Ruminant Digestive System

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- Examples of ruminants and non-ruminants
- The four compartments of the ruminant stomach
- The basic parts and functions of the ruminant digestive system

ABOUT THEMSELVES:

- To learn more about their own digestive system
- The differences between monogastric and ruminant digestion

Material Needed:

- Member Handout 5, Digestive Tracts
- Activity Sheet 4, Parts of the Ruminant Stomach
- Chalkboard and chalk or flip chart and markers

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

Something amazing happens when you feed your dairy animal—the forage and grain mix turn into milk! The method by which this takes place is through the dairy animal’s digestive system. Its main purpose is to convert food into nutrients that can be used for a productive purpose.

What are the two distinct types of farm animal digestive systems? What are the main differences?

1. Ruminant
2. Simple or Monogastric

Cud-chewing animals such as cattle, sheep, and goats have a ruminant system. Ruminant animals have a stomach with four compartments.

Non-ruminants have simple stomachs and include man, horses, swine, dogs, cats, and poultry.

The ruminant digestive system has several advantages over the non-ruminant digestive system. Ruminants have larger digestive systems with more capacity for forages. The system is also more efficient in utilizing fiber.

Let’s take a look at the ruminant digestive system.

Discuss briefly.

Have members give examples of each:
1. Ruminant (cud chewing): cattle (beef, dairy), sheep and goats

2. Non-Ruminant: horse, swine, Dogs, and cats

Leader Notes

ACTIVITY

List functions on flip chart or chalkboard. Ask members to arrange in sequence.

What are the five major functions the digestive system performs:

1. food intake
2. storage
3. digestion
4. absorption
5. elimination of waste

Pass out Member Handout 5, Digestive Tract.

These functions take place in a special system called the digestive tract. This can be visualized as a hollow, tube-like assembly line, but instead of building something, this factory system takes it apart. Each feedstuff is broken apart into smaller and smaller units so it can be used or eliminated. This digestion process prepares food for absorption and use by the dairy animal's body. This is accomplished by enzyme action which breaks the food down into simple compounds.

Have members name and/or discuss these functions

The organs that make up the digestive system may be grouped into two categories:

Point to parts of the canal or have members name them.

1. Alimentary canal—the canal is the tube-like assembly line that extends from the lips to the anus. Digestive processes take place in the alimentary canal. The walls of the canal are covered with involuntary muscles which mix the food with digestive juices and move the food along the digestive tract. The parts of the canal are the mouth, pharynx, esophagus, stomach, small intestine, cecum, large intestine, and anus.
2. Accessory organs—These are the organs that aid the digestive tract with the receiving and digestion of food. Included in this category are the teeth, tongue, salivary glands, liver, and pancreas.

Can describe each part or divide group into teams and alternate asking questions.

Let's look at how each of these parts function in the digestive system.

Alimentary Canal

1. What is the first part of the alimentary canal to function? (mouth)
2. What does the pharynx do?
3. Describe the esophagus.
4. Name the four compartments of a dairy cow stomach.

Mouth—The mouth is the first part of the alimentary canal to function. It is used by animals for the intake of food and mastication (chewing). Saliva is also secreted to begin digestion and moisten feed before it is swallowed.

Pharynx—The pharynx is a muscle membrane that functions in both the digestive and respiratory systems. It serves as a passage gate for food going from the mouth to the esophagus and air going to the lungs.

Esophagus—The esophagus is a long muscular tube which allows the food to pass from the pharynx to the stomach.

Stomach—Cattle have a compound stomach with four compartments. These four "stomachs" can utilize large amounts of feed, both concentrates and forages.

ACTIVITY

The first compartment is the rumen or paunch. It is the largest compartment and serves as storage for large amounts of feed. Feed stored in the rumen is regurgitated in a cud and rechewed.

Next is the reticulum or honeycomb. The adult cow can hold 40-60 gallons of feed material in the first two compartments (rumen and reticulum) where food is agitated, fermented and digested.

The third compartment of the ruminant stomach is the omasum or manyplies. One of its roles is to grind and squeeze the liquid out of the feed.

The fourth compartment is the abomasum or true stomach. This is the only place in the stomach where digestive juices are produced. It is similar to our human stomach.

Small Intestine—The food passes from the true stomach to the small intestine where the food is further digested and absorbed by the blood. The liver secretes bile into the small intestine to help neutralize the acidity of the feed and allow enzyme action to occur. The pancreas provides pancreatic juices to the small intestine to aid digestion.

Large intestine—The non-absorbed material passes from the small intestine into the large intestine where digestion and absorption continues.

Anus—All non-usable feed nutrients and excess materials are eliminated from the canal through the anus.

Accessory Organs

During the digestive process the accessory organs carry out numerous functions. Teeth aid in the grinding of feed while the tongue turns and rolls the feed as it is chewed.

The salivary glands secrete saliva into the mouth to begin digestion and moisten feed before it is swallowed. The liver secretes bile and the pancreas secretes pancreatic juices into the small intestine to neutralize the acidity of the feed after it leaves the stomach.

Normally, about four days are required for feed to pass through the digestive tract of ruminants. The usual amount of time feed is in each part of the tract is:

Rumen/reticulum—	61 hours
Omasum—	8 hours
Abomasum—	3 hours
Small Intestine—	7 hours
Large Intestine—	8 hours

Leader Notes

5. What happens to food in the paunch and reticulum?
6. What is the name of the third compartment of the ruminant stomach?
7. The last compartment is the only place where digestive juices are produced. What is its name?

Pass out Activity Sheet 4, Parts of Ruminant Stomach, as a review.

8. What is the function of the small intestine?
9. What is the function of the large intestine?
10. What is the last part of the alimentary canal?

11. How long do you think it takes for feed to pass through the digestive tract of ruminants?

Write the number of alimentary tract parts and number of hours on poster or chalkboard.

Leader Notes

Have members work together in small groups to list the functions in sequence and where they occur.

ACTIVITY

The amount of feed left in the digestive tract affects the dairy animal's appetite. Dairy animals fed easily digested feed, such as grain, have better appetites than cattle fed harder-to-digest feeds, such as hay.

SUMMARY

All of the feed eaten by animals is not absorbed and used for growth, body maintenance, or production. Only the nutrients that pass through the walls of the digestive tract is absorbed and used by the body. Some of the feed leaves the body undigested. Composition of feed, feed intake, and differences among the animal affect digestibility.

What are the two distinct types of digestive systems? Ruminant and Non-ruminant (simple or monogastric). What are the digestive system's five basic functions and where do they occur:

1. food intake—mouth
2. storage—stomach
3. digestion—stomach, small intestine
4. absorption—small and large intestine
5. elimination—large intestine, anus

DIALOGUE FOR CRITICAL THINKING:**Share:**

1. What was the easiest and most difficult part of the digestive system to understand? Why?

Process:

2. Discuss the five functions of the digestive system. What problems would occur if each function was omitted one at a time?
3. What are the advantages/disadvantages of the ruminant digestive system?

Generalize:

4. What conclusions can be made about a monogastric digestive system? Efficiency? Capacity? Problems?
5. How does understanding a digestive system assist in maintaining a proper diet?

Apply:

6. How will your eating habits change as a result of this activity?

ACTIVITY

Leader Notes

GOING FURTHER:

- Make a drawing of the Ruminant Stomach
- Describe the Alimentary Canal of Ruminants to other members.
- Give an illustrated talk on the Ruminant Digestive System.
- Visit a research area and observe the digestive tract in action.
- Study which feeds are more digestible than others.
- Visit a feed mill and ask about digestibility of feeds.

REFERENCES:

Author:

Jimmy L. Rodgers, County Extension Agent, Texas

Edited and reviewed by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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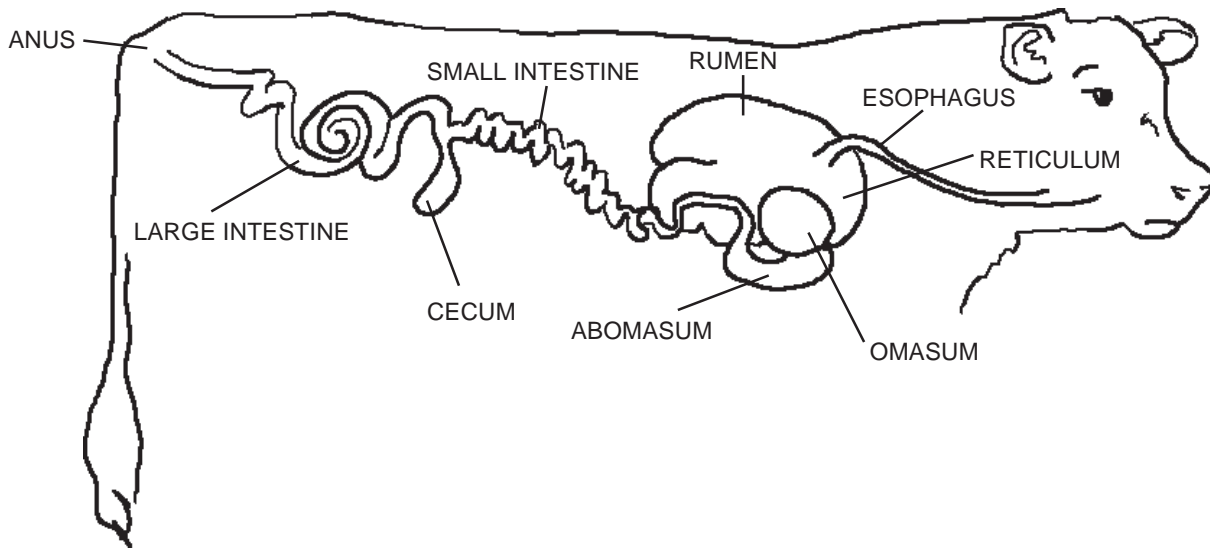
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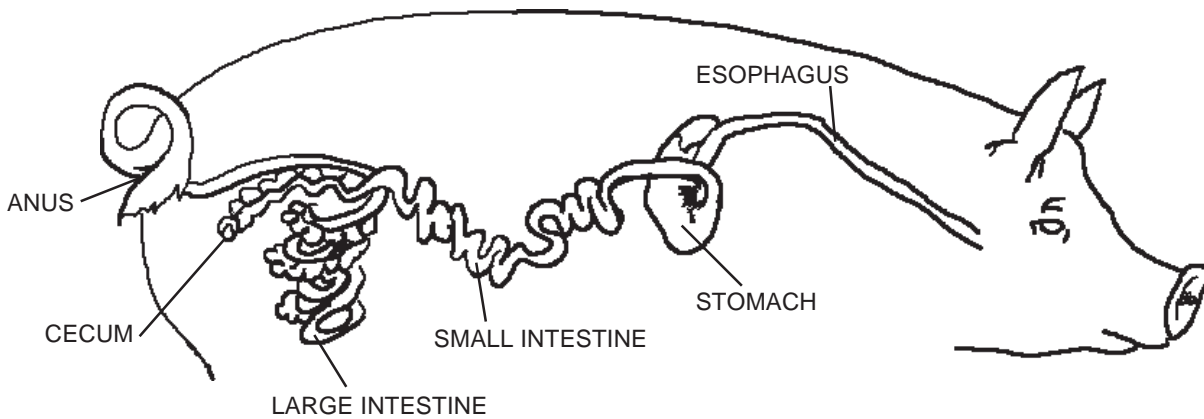
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RUMINANT DIGESTIVE SYSTEM
DAIRY CATTLE, LEVEL III
Member Handout 5, Digestive Tracts

RUMINANT DIGESTIVE TRACT
(Alimentary Canal)



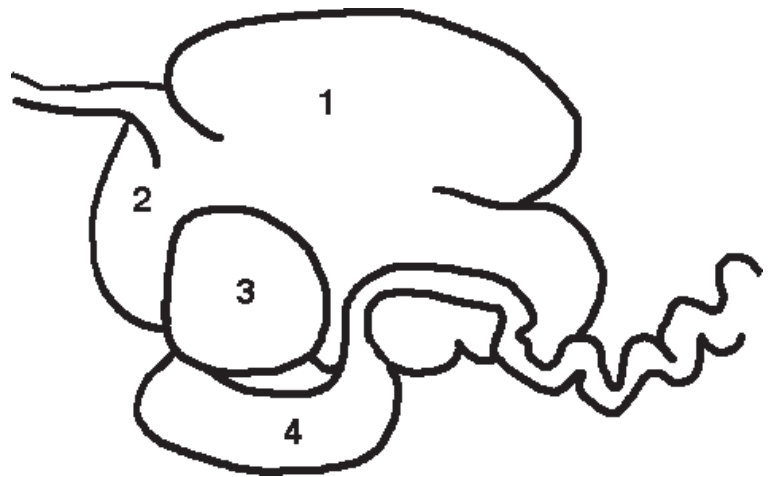
MONOGASTRIC DIGESTIVE TRACT



RUMINANT DIGESTIVE SYSTEM
DAIRY CATTLE, LEVEL III
Activity Sheet 4, Parts of the Ruminant Stomach

Draw a line from the name to the numbered compartment.

- Abomasum
- Omasum
- Rumen
- Reticulum



Abomasum (true stomach)

Omasum

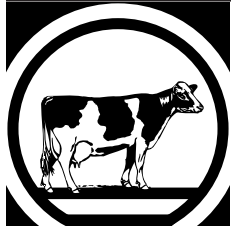
- Liquid is removed from the feed by muscle contractions
- Breaks up coarse particles in feed

Rumen

- Functions as a storage area for food
- Aids in the breakdown of coarse particles through bacterial action

Reticulum (honeycomb)

- Honeycomb-like walls retain foreign materials that could injure the digestive system
- Also called the hardware stomach
- Functions are similar to the rumen



Production of Quality Hay

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- To identify five classes of forages that may be used for hay production
- When hay should be harvested for the greatest amount of digestible nutrients
- The best environmental conditions for hay harvesting
- Four steps in producing high quality hay

ABOUT THEMSELVES:

- The importance of good timing and preparation

Materials Needed:

- Vegetative plant (pre-head formation)
- Mature plant (headed)
- Member Handout 6, Forage Class Quality
- Activity Sheet 5, Forage Crude Protein and Stage of Growth

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

A major resource of Kansas is its grassland production. The production of grass or forage is the major source of nutrients for livestock. The forage can be either grazed as pasture or harvested and stored as hay for feeding at a time when pasture is not available. All forages that serve as pasture can also be harvested as hay.

Special attention should be given to hay quality since animal performance is directly related to the quality of hay or pasture being consumed. Legumes such as alfalfa, clovers, peas, and vetches usually produce the highest quality hay because they are high in protein and minerals, and are readily digested. Grasses usually produce higher forage yields, but are generally lower in protein and minerals, and less digestible than legumes. Annual grasses (planted yearly) are more easily digested than perennial grasses (re-grown from rootstock each year). Cool season grasses are higher in digestibility than warm season grasses.

Weather conditions that favor growing, harvesting, and drying hay occur during the warm season. So warm season annual and perennial forages are favored. Cool season forages, such as oats, wheat, or ryegrasses, can make good quality hay when weather conditions are favorable for harvesting and drying.

Leader Notes

Have members list forages they know that are used for hay production.

Ask members to list and discuss the five classes of forages:

1. Legumes
2. Cool Season Annual Grasses
3. Warm Season Annual Grasses
4. Cool Season Perennial Grasses
5. Warm Season Perennial Grasses

Classify the forages listed earlier.

Distribute Member Handout 6, Forage Class Quality.

Discuss which forage classes can meet all the net energy requirements for various types of cows. Which forages will need to be fed with grain, etc? Which forages may be too valuable for dry cows and heifers.

Leader Notes

Take a field trip and have members collect samples of forages in the two stages of maturity. Notice the stem and leaf differences. Estimate percent crude protein for each sample and list on Activity Sheet 5, Forage Crude Protein and Stage of Growth. If a laboratory is available run a crude protein test and list the actual on your activity sheet.

List and discuss the four main steps to produce quality hay.

1. Growth stage harvested
2. Fast curing
3. Weather during harvest
4. Proper storage

ACTIVITY

State of growth (plant maturity) is another factor that affects the quality of forage. As forage plants mature (get older), crude protein percentage, digestibility, and palatability of those plants decline.

Harvest hay plants when the greatest amount of digestible nutrients per acre can be obtained. This is usually at a stage of growth slightly before the plants begin maturing (producing seedheads). Delaying harvest may provide an increase in yield but protein and digestibility decline so that quality of the hay is lower. Highest yield of digestible nutrients will usually be obtained when the crop is harvested in early bloom.

Cure hay quickly after mowing. Hay crops contain more than 60 percent moisture when harvested and must be dried to 12-18 percent moisture for safe baling and storage. Rapid curing and baling conserves leaves, nutrients, color, palatability, and other quality factors. Use a hay conditioner or a swather equipped with a crimper to reduce curing time, especially for large stemmed plants. Hay conditioners or crimpers permit moisture to evaporate quickly and reduce losses from climatic factors which reduce quality. Use a hay conditioner within 15 minutes after cutting. To prevent heating and molding, avoid baling hay with excess moisture.

Store baled hay inside a shed, or on dry, level, well-drained sites. Stack the bales to avoid wasted space and permit easy handling. Even large round bales must be set on a well-drained site. Crushed rock makes a good base for those bales. The bales will act like a sponge and soak up moisture from wet soil. More spoilage can occur on the bottom side of the bale than the top.

When growing forages, adequate amounts of plant nutrients are essential for good quality hay. In addition to increasing hay yields, fertilizer improves protein level, palatability (taste), and performance of animals consuming the hay. A ton of 15 percent crude protein grass hay removes approximately 50 pounds of nitrogen, 15 pounds of phosphorus (P_2O_5) and 40 pounds of potassium (K_2O) in addition to secondary and micro-nutrients. Since soils vary in their ability to supply plant nutrients, a soil test is important in determining the kind and amount of fertilizer needed for hay production.

SUMMARY

Hay production is a major activity for livestock producers. Knowledge of the factors affecting quality hay production is essential. Only by producing and feeding high quality hay can individuals get the animal performance desired.

ACTIVITY

Leader Notes

DIALOGUE FOR CRITICAL THINKING:

Share:

1. Why is it important to know when a particular hay has the most protein?
2. What are the advantages of each kind of hay?

Process:

3. If cost were no concern, what hay would you use? Why?
4. If cost is a major concern, what hay would you use? Why?

Generalize:

5. Like hay production, there is clearly a best time for you to do something. What are some things in your life that require good timing and preparation? (getting in shape for sports, decisions, immunizations, etc.)
6. Which is most important, timing or preparation, in the items you listed? Why?

Apply:

7. When and how will you use goal setting, planning and preparation in the future?

GOING FURTHER:

- Actively participate in or observe hay production and harvesting and prepare a report describing activities with possible suggestions that might improve the quality of hay being harvested.
- Attend a hay show and observe the different qualities of hay.
- Give an illustrated talk on producing quality hay.
- Observe a hay crop and project when the best time for harvest would be.
- Visit a farm equipment dealer and become familiar with hay harvesting equipment.
- Help your county Extension agent organize a county hay show.

Leader Notes

ACTIVITY

REFERENCES:

Author:

Donald J. Dorsett, Extension Forage Specialist, Texas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

Reviewed by:

Gary L. Kilgore, Extension Specialist, Crops & Soils, Southeast Kansas

Paul D. Ohlenbusch, Extension Specialist, Range and Pasture Mgt., Kansas State University

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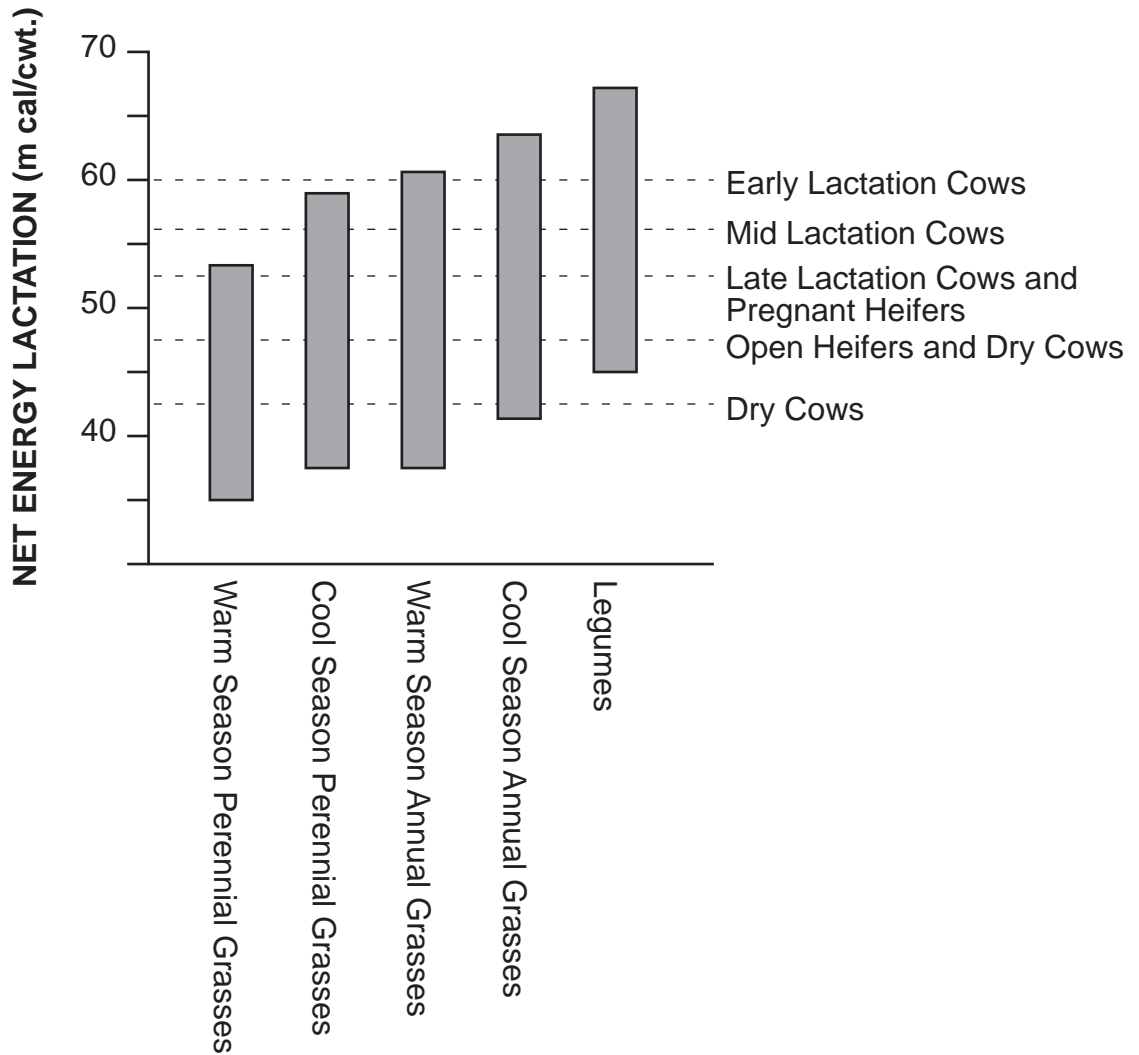
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PRODUCTION OF QUALITY HAY
DAIRY CATTLE, LEVEL III
Member Handout 6, Forage Class Quality

CLASSES OF FORAGE AND THEIR QUALITY



Range in net energy lactation of several classes of forages and the ability of the forage to meet the needs of cows.

Note: Perennial grasses cannot usually meet the needs of lactating cows. Legumes and cool season annual grasses are usually too valuable for dry cows and heifers.

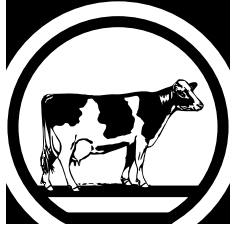
PRODUCTION OF QUALITY HAY

DAIRY CATTLE, LEVEL III

Activity Sheet 5, Forage Crude Protein and Stage of Growth

Record stage of growth and an estimate of the percent crude protein for your samples. If a laboratory is available, record actual crude protein percent.

			Your sample	
Crop	Stage of Growth	Crude Protein %	Estimated Crude Protein %	Actual Crude Protein %
Alfalfa	Early Bloom	18.0		
	Full Bloom	14.0		
Wheat	Boot	16.0		
	Full Bloom	8.5		
Sudan	Early Boot	17.0		
	Full Bloom	8.0		
Brome	Late Boot	17.0		
	Full Bloom	10.0		
Prairie Grass	Early Boot	13.0		
	Mature	6.0		
Other Forages You Collected:				



Taking a Hay Sample

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- How to sample forages properly
- Why forage testing is important

ABOUT THEMSELVES:

- The importance of following directions - (when, how, which ones)
- The importance of quality control

Materials Needed:

- Bale of Hay
- Forage Probe
- Electric Drill
- Extension Cord
- Source of Electricity (110 volt generator will work if electricity is not available)
- Bucket
- Plastic Bag
- Sample Data Sheet from nearby laboratory or Extension office

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

Changing low quality forages into energy and quality protein is one important part of dairy production. Forage testing is the only sure way of knowing the amount of nutrients supplied by forages. This helps determine the correct grain mix to meet the animal's nutrient requirements.

Hays have a wide range of nutrient content both within and between species. For example, alfalfa hay might average about 16 to 18 percent crude protein, but may vary from as low as 12 percent to as high as 30 percent on a dry matter (zero percent moisture) basis. The same is true of grass hays. Prairie hay will usually average about 6 percent crude protein, but may vary from as low as 3 percent to as high as 10 percent.

To accurately formulate dairy rations, one must know the nutrient content of each feed ingredient. Testing is the best way to find out what nutrients are in the hay.

One method to obtain a sample of hay to be analyzed is the handsample. Open the bale and carefully lift out a handful of the hay as the sample.

Have members take samples from blocks of hay. Call their attention to how easily leaves break off unless handled gently.

Leader Notes**ACTIVITY**

	<p>This should be accomplished in two to three places in the bale. Care should be exercised to keep from breaking leaves off the sample being lifted out. Simply grabbing and pulling out a sample will cause leaves to break off and result in a sample that is much stemmier than the rest of the hay, which results in non-representative samples. Since a stemmier sample results, the results of the analysis will be lower than the rest of the bale of the hay.</p>
Have a forage sampler available and allow members to take samples.	<p>Sampling a forage for analysis is often a critical part of the analysis. The sample must be representative of the forage being tested. A good way to get a forage sample is to use a “Penn State” forage sampler. This sampler fits a ½-inch drill or hand brace and is simply drilled into the end of the bale of hay. It cuts a forage sample as it drills into the bale and provides a very representative sample of the bale.</p>
Show bale probe.	<p>Sample 8 to 10 bales of the hay per lot to be tested, using a forage probe.</p>
Begin procedure.	<p>Tighten the forage probe in the electric drill chuck. Plug in the drill and core the bale of hay. You will notice that as the teeth on the probe tip cut through the hay, the cuttings will be inside the probe. It is better to bore the bale on an angle or from the end of the bale. If you bore vertically into the side, the probe tends to go between the slice of the bale missing cuts of hay. After one or two corings from the bale, release the probe from the chuck adapter and dump the hay cuttings into a bucket.</p>
Demonstrate each of the steps slowly.	
Allow members to core bales and prepare samples.	<p>Continue coring each of the remaining bales and dumping the probe cuttings into the bucket. Mix the subsamples well by stirring with your hand.</p> <p>Place about a quart of the mixed hay samples into a plastic bag. Seal the bag air tight so that the lab receives hay with the same moisture content as it was in the bale.</p> <p>Fill out the data sheet supplied by the laboratory of your choice and indicate what tests you want the lab to perform, including any special instructions. You are now ready to prepare the bag of hay clippings for shipping to the lab. Some labs ask for this data on the sample bag.</p> <p>Relative Feeding Value can be calculated from results of the Acid Detergent Fiber (ADF) and Neutral Detergent Fiber (NDF) analyses. This is an extremely helpful measurement of hay quality that can be used to compare forages.</p>

ACTIVITY

Leader Notes

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What was the hardest part of taking a hay sample?
2. Why do you need to take hay samples?

Process:

3. Why is it important to take samples from more than one bale?
4. What will you do with the information you get from the sampling?

Generalize:

5. Following directions was important in this activity. How important is following directions in other areas of your life?
6. How does following directions relate to saving time and energy?

Apply:

7. How can you use what you learned about quality control in future considerations?

GOING FURTHER:

- Send samples to lab for testing. Evaluate results at next meeting.
- Visit a dairy or someone that buys lots of hay to see how they test for quality before feeding hay.

Leader Notes

ACTIVITY

REFERENCES:

Author:

Ted Wary, former County Extension Agent, Kansas
Brian A. Swisher, County Extension Agent, 4-H, Kansas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State
University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State
University
James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas
State University
Paul D. Ohlenbusch, Extension Specialist, Range and Pastures Mgt.,
Kansas State University

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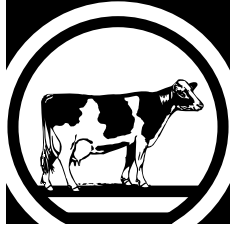
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Selection of Quality Hay

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- Distinguish good quality hay from poor quality hay
- Two techniques for estimating hay quality
- Five physical characteristics of hay
- Value of chemical analysis in hay testing

ABOUT THEMSELVES:

- Importance of practice in developing a skill
- Importance of a quality standard

Materials Needed:

- Four actual hay samples
- A bale of hay and equipment for taking a hay sample
- Activity Sheet 6, Hay Judging Placing Card or plain paper
- Activity Sheet 7, Hay Judging Contest Grading Card
- Member Handout 7, Official Scoring for Hay Shows
- Chalkboard and chalk or flip chart and marker

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Hay is often a major ingredient in dairy rations. Special attention should be given to hay quality because animal performance is directly related to the quality of hay being consumed. Hay varies in quality more than any other harvested field crop. Livestock feeders seeking high profits consider good quality forage the basis of any livestock ration because any essential nutrient not furnished in the forage must be supplemented by expensive concentrates.

Two major techniques for estimating quality in hay are:

1. visual estimation
2. chemical analysis (forage test) primarily for protein level

True hay quality can only be expressed as feeding value. Since hay must be fed before true feeding value is known, the use of visual estimation or chemical analysis will provide an indication of hay quality that is correlated with animal performance.

Leader Notes

Pass out Activity Sheet 6, Hay Judging Placing Card or plain paper. Have members place the hay samples 1st, 2nd, 3rd, and 4th with reasons. After the lesson, have them do it again to see if there are different placings.

Leader Notes**ACTIVITY**

List factors on chalkboard or flip chart.

Pass out Activity Sheet 7, Hay Judging Contest Grading Card, and have members score a hay sample as each physical characteristic is discussed.

A member who knows what to look for when evaluating hay will be in a much better position to provide an economical and balanced ration for their project.

Several factors may affect the quality or feeding value of hay. These include species of hay (alfalfa vs. prairie hay), fertilization program on the hay meadow, age or stage of maturity, and the curing or harvesting practices used.

Let's examine a hay sample and evaluate its physical characteristics.

VISUAL ESTIMATION

When estimating the physical characteristics of hay, a representative bale should be opened and one or more sections examined for maturity, texture, leafiness, foreign matter and color.

Stage of Maturity—The maturity at which hay is harvested is one of the most important factors influencing quality. This factor has a value of 40 points for grass hay and 20 points for legume hay. Values differ because legume plants do not lose quality as rapidly with age as grasses do. In determining the maturity score look for blooms or seedheads and examine the length of stem. As a guide, grass hays with 1 percent or more seed stems should score not more than 30 points. Legumes at the one-tenth bloom stage should not score more than 15 points. Hay harvested at younger stages should receive higher scores. More mature plants have long, coarse, fibrous stems, while small, pliable stems indicate immaturity.

Texture—Texture pertains to stem size and pliability or acceptance by animals. Small stems which are pliable and flexible have greater digestibility. Texture accounts for 20 points when judging grass hay and 15 points when judging legume hay. Texture is best determined by running the hand along the cut edge of the bale or by pressing a sample between the hands to determine pliability.

Leafiness—Leafiness refers to the proportion of leaves to stems. Leaves are higher in nutrients than stems, therefore, a hay containing a high proportion of leaves scores higher than one with a high proportion of stems. Leafiness accounts for 10 points when judging grass hays and 35 points when judging legume hays. This difference is due to the greater hazard of leaf shattering of legume hays. Leaf shattering is not considered a major problem in harvesting grass hay. Not only is it important to have a high percent of leaves, but the leaves should be attached to the stems to reduce feeding waste.

ACTIVITY

Leader Notes

Foreign Material—Foreign material such as weeds, stubble, manure, mold, and any non-edible or injurious matter is objectionable. Foreign material accounts for 20 points when judging both grasses and legumes. A greater penalty is assessed for injurious material and noxious weeds than for non-injurious material and non-noxious weeds. The rules for some shows permit disqualification of samples considered to contain sufficient quantities of foreign material that may be hazardous to livestock.

Color—Color indicates carotene content and vitamin A potential. A bright green color also indicates good harvesting conditions. Although color is the most visible characteristic of hay, it alone is not a reliable indicator of quality. Color accounts for 10 points when judging both grasses and legumes.

Determine physical score. The physical scorecard totals 100 points, as illustrated on the Official Scoring for Hay Shows handout.

Pass out Member Handout 7, Official Scoring for Hay Shows.

CHEMICAL ANALYSIS

A chemical analysis is a guide for estimating the nutrient value of hay. Crude protein percentage is the most common chemical determination and the level of protein is generally correlated with animal performance and hay quality. Chemical analyses are not able to indicate many of the objectionable features that are obvious on visual examination.

Use sampling techniques learned in previous lesson to obtain a sample for chemical analysis.

When the results of a chemical analysis are available, the hay can be rated numerically.

Determining Chemical Score—The analysis used to determine the chemical score is the crude protein content of the hay. Protein is a major nutrient requirement of livestock, and reliable laboratory analyses are readily available for determining nutrients. Other analyses beneficial for determining hay quality are available; however, many of these are laborious and not always available. The various hay plants have different protein level potentials. The chemical score of each type is based on a protein level considered attainable under practical management. These are indicated in the chemical scoring section of the Official Scoring for Hay Shows.

To rate the hay samples using either visual examination or chemical analysis or by averaging the two together, the following scoring system on the Official Scoring for Hay Shows handout is suggested:

May want to list chemical scorecard on chalkboard or flip chart and/or use Member Handout 7, Official Scoring for Hay Shows.

Leader Notes**ACTIVITY**

Quality Rating	Ribbon Color	Score
Excellent	Blue	85 points or more
Good	Red	70–84 points
Fair	White	50–69 points
Poor	None	Below 50 points

Have members re-evaluate the hay samples. See if placing of hay samples are different from placing prior to the lesson.

Wrap-up session with a placing or grading contest or have individuals explain the differences in two hay samples.

SUMMARY

Since forage as grazing or hay is a major source of nutrition for livestock in Kansas, knowledge of the factors affecting quality in forage is valuable. By being able to determine if a forage is high quality or low quality, an individual can evaluate the nutritional status of livestock consuming the forage.

The visual factors of maturity, texture, leafiness, foreign materials, and color give firm indications of the quality of the hay. A chemical analysis gives a direct measurement of the forage's nutritive value. Using either or both methods of evaluations will provide a definite indication of forage quality and animal performance.

With practice, a member can learn to select quality hay for the dairy project. This skill can improve the production of the animal and can increase the economy of feeding.

DIALOGUE FOR CRITICAL THINKING:**Share:**

1. What are some physical characteristics of hay?
2. What physical characteristic of hay is hardest for you to evaluate? Why?
3. How easy or difficult was it to take a forage sample for chemical analysis?

Process:

4. What are the advantages of high quality versus low quality hay?
5. What types of animals can utilize lower quality forage?

Generalize:

6. Many of the things you do, like judging hay quality, require practice. What are some things you do that require practice? Why is practice important?

ACTIVITY

Leader Notes

7. What is the significance of practice in developing a skill?
8. What is the purpose of quality standards in skill development?

Apply:

9. What skills are you currently developing? For what purpose?
10. What effect do quality standards have in other aspects of your life?

GOING FURTHER:

- Attend the judging portion of local hay shows and discuss the judging procedures with the judge.
- Participate in a hay judging contest.
- Enter hay in a local hay show to have it evaluated.
- Give an illustrated talk on “Selecting Good Quality Hay.”
- Evaluate hay being fed to project animals.

REFERENCES:

Author:

This lesson was modified from original material authored by Donald J. Dorsett, Extension Forage Specialist, Texas, with adaption by: Paul D. Ohlenbusch, Extension Specialist, Range and Pasture Management, Kansas State University
James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

Reviewed by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

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SELECTION OF QUALITY HAY
DAIRY CATTLE, LEVEL III
Activity Sheet 6, Hay Judging Placing Card

Hay Judging Contest Placing Card

Contestant's name _____ Class number _____

First

Second

Third

Fourth

SELECTION OF QUALITY HAY
DAIRY CATTLE, LEVEL III
Activity Sheet 7, Hay Judging Contest Grading Card

Contestant's Name _____

Class Number: _____

SAMPLE No.	MATURITY			TEXTURE			LEAFINESS			FOREIGN MATTER					COLOR			SCORE
	Preboot or Pre-Small	Boot or 1/10	Headed or Full Large	Pliable -----	Moderately Pliable Medium	Un-Pliable -----	Leafy Bloom	Shattered Bloom	Stemmy Bloom	Clean	Weeds	Stubble	Mold	Other	Bright	Bleached	Dark	
1																		
2																		
3																		
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9																		
10																		

61-Dairy Cattle, Level III

Scoring
Point Value

Maturity

Texture

Leafiness

Foreign Matter

Color

Grass 40

20

10

20

10

Legume 20

20

30

20

10

SELECTION OF QUALITY HAY**DAIRY CATTLE, LEVEL III****Member Handout 7, Official Scoring Card for Hay Shows**

Both physical and chemical factors are considered in classifying all hay entries.

A. Physical Scorecard

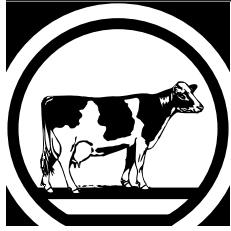
Factor	Grass Hay	Legume Hay
Maturity	40	20
Texture: size of stem and pliability	20	15
Leafiness	10	35
Freedom from foreign material	20	20
Color	10	10
Total possible physical score	100	100

B. Chemical (Crude Protein) Scorecard

Type of Hay	Factor for each Percent Crude Protein		Percent Crude Protein for 100 Points		Total Chemical Score
Grass, including perennials such as blue stem and annuals such as sorghum-sudangrass hybrids	8.33	×	12.0	=	100
Grass-legume mixtures and other legumes	6.25	×	16.0	=	100
Alfalfa	5.0	×	20.0	=	100

C. The chemical score and physical score are averaged to determine the final classification score for each entry. Quality is determined as follows:

Final Score	Quality Rating
85 or above	Excellent
70 to 84	Good
50 to 69	Fair
Below 50	Poor



The Comfort Zone: Knowing Your Animal's Normal Temperature

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The healthy temperature of dairy animals and what internal and external factors affect it
- The healthy temperatures of five other animals, including people
- How to take the temperature of a dairy animal

ABOUT THEMSELVES:

- Body functions to help adjust to different environmental temperatures.
- An awareness of their own comfort zone

Materials Needed:

- Thermometers (glass or the newer digital)
- Paper towels or clean rags
- Petroleum jelly or similar lubricant
- Paper and pencils
- Model animal of a calf (patterns may be purchased)
- Member Handout 8, Animal Vital Signs
- Live calves (optional)

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Leader Notes

Since farm animals are warm-blooded, we are going to be learning more about this class of animals and how to determine the temperature of your dairy animals.

The body temperature of warm-blooded animals tends to vary from about 98°F to 105°F. Death occurs if environmental temperatures should become extremely high or low for any appreciable time unless the animal can get out of the extreme temperatures. People can put on coats to keep warm when it's cold, or wear light-colored, light weight clothing when it's hot. Animals, of course, don't have this luxury and depend on us to help them maintain their body temperature.

When the temperature is between 0°F and 50°F, animals increase their feed intake, exercise more, increase their heartbeat rate, and reduce blood flow to the surface of their skin and to their outer limbs. Animals may shiver, which is a form of exercise that generates heat. Some animals get close together when they are cold so each can make use of heat from others. Getting close together can lead to "piling up" and death if it is carried to an extreme.

Ask members to list what animals do to stay warm before using this paragraph.

Leader Notes

ACTIVITY

Very young animals, chill easily and can not increase their body temperature until they obtain food and generate heat through the work of digestion. Very young animals may be severely chilled when the temperature is cold because they are wet when born and evaporation of the moisture from them increases the cooling effect of the temperature. If born in cold weather, the young should be wiped dry and encouraged to nurse almost immediately; it may be necessary to provide some kind of heat for the newborn animal.

The comfort zone for most farm animals is between 60 to 65°F. In this range, heat production and heat loss are about the same. Most farm animals, like dairy cattle, produce a great amount of heat just through normal body functions like walking, digestion, breathing, and other activities. Thus, most mature animals are concerned with staying cool rather than with keeping warm, except during periods of extreme cold. Dairy cows fed large amounts of feed during early lactation will create so much heat from digestion that they will have difficulty staying cool when the environmental temperature is above 65°F.

List what animals do to keep cool.

Between 65°F and 80°F, animals become slightly uncomfortable. Their blood vessels dilate near the skin and in their limbs so that the surface of their bodies becomes warm, water consumption increases, breathing becomes rapid, and, in animals that can sweat, perspiration increases. When and where do you observe some of these signs on your body or friends' bodies?

Above 85°F, animals that have the ability to sweat keep their bodies wet with sweat so that evaporation can cool them. Non-sweating animals breathe rapidly (called panting) and are cooled by evaporation in the lung tissues. What are examples? (Hogs)

Have members list and discuss ways to keep dairy animals comfortable during extreme heat and cold.

When the temperature exceeds 90°F, animals suffer. Hogs may die from such heat. All animals tend to become less active, and they usually lie down in the shade. Reduced activity decreases the amount of heat that is generated and lying in the shade reduces the heat from the sun. Water consumption and urine excretion increase, and if the water consumed is cooler than the temperature of the animal, considerable cooling and relief can occur. What are some things a producer can do to keep dairy animals comfortable during extreme heat and cold?

When the body temperature of an animal exceeds normal because the animal cannot dissipate its heat, a condition known as fever results. Fevers often are most severe when temperatures are extremely high or extremely low. How should fever be treated? (Keep animal as comfortable as possible while medication is given.)

An animal can't tell you when it is sick. You have to be able to tell. The best method is to take the temperature of your animals if you are not certain.

ACTIVITY

Let's look at the handout, "Animal Vital Signs" to see what the normal temperature of most farm animals is. We can see that most dairy cattle run about 101.5°F. But then you should begin looking for other signs like those we listed before.

According to this list, what other animal has about the same temperature as a cow? What kinds of animals tend to have relatively high temperatures?

Now, how can you take the temperature of your dairy animal? The best method is the use of a rectal thermometer. Why wouldn't you want to use a human thermometer for dairy cattle? (You will need to be sure to buy one that is made for farm animals, not one for humans since their temperature, remember, is much lower than most farm animals.) There are a variety of kinds of thermometers available, from the traditional glass mercury thermometer all the way to fancy digital thermometers. The newer digital thermometers are the most accurate and easy to use, but they are also the most expensive and only cost-effective for very large herds.

Let me demonstrate how to use a normal glass thermometer for you and then we'll have you practice on some animals. First, you will need to restrain the animal in some fashion. A squeeze chute is best, but if your animal is young enough and used to having you around, tying up will be sufficient. Gently lift the tail, and insert the thermometer about 2 inches into the anus. You will need to leave it there for about a minute to get an accurate reading. Hold it there and remain calm—don't move around a lot or you will cause your animal to get excited.

After about a minute, remove the thermometer and quickly wipe it off with a paper towel or clean rag. Then, read the temperature. Record it on a piece of paper so you don't forget it. Now, compare it to what you know about the normal temperature range of a dairy animal.

Let's practice on some calves now.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What did you learn about warm and cold-blooded animals?
2. If you took the temperature of a live calf, explain how you did it? What was difficult? Easy?

Process:

3. What are the indicators that animals are cold/hot?
4. What experiences have you had in treating animals with a fever? What did you do?

Leader Notes

Pass out Member Handout 8, Animal Vital Signs, to each member.

Thermometers can be difficult to read. It may help to take a glass of water and have the member check the water temperature to learn to read the thermometer.

Let the members practice taking a calf's temperature on either the live animal or the model of a calf. Use care with live calves to avoid kicks or other injuries. Be sure everyone has a chance to try it if they want.

Leader Notes

ACTIVITY

Generalize:

5. What are you able to do that cold-blooded animals cannot do?
6. What affect do wet and windy conditions have on maintenance of body temperature?
7. What do you think is your "comfort-zone?" Where are you most comfortable?

Apply:

8. Chart the different temperatures in the rooms of your house. How do you adjust your clothing or activity level for that room for optimum comfort?

GOING FURTHER:

- Find out why some Brahma-breed cattle are often preferred in southwestern states like Texas and Arizona.
- Give a demonstration at your next club meeting on taking the temperature of an animal.
- Survey your own facilities for animals at your place. Do you have places for them to get out of the sun and heat during the summer? How can your facilities be improved economically?
- Visit a veterinarian, ask how body temperature is used in diagnosis and treatment.

REFERENCES:

Author:

Kirk A. Astroth, Extension Specialist, 4-H Youth Programs, Montana State University

Brian A. Swisher, County Extension Agent, 4-H, Kansas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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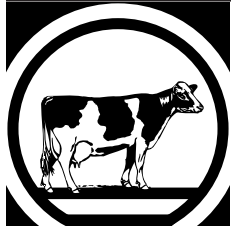
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**THE COMFORT ZONE:
KNOWING YOUR ANIMAL'S NORMAL TEMPERATURE**

DAIRY CATTLE, LEVEL III

Member Handout 8, Animal Vital Signs

Animal	Rectal Temperature °F	Respiration Rate (per minute)	Heart Rate (per minute)
Human	98.6	16 (14-20)	70 (60-100)
Cattle	101.5 (101.4-102.8)	30 (10-30)	50 (40-70)
Sheep	102.4 (100.9-103.8)	19 (12-20)	75 (60-120)
Horse	100.0 (99.1-100.8)	12 (8-16)	45 (35-70)
Swine	102.5 (101.6-103.6)	16 (8-18)	60 (55-85)
Chicken	107.1 (105.0-109.4)	12-36	275 (250-300)



Where Does It Hurt?

Introduction to Common Cattle Diseases

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The names and causes of some common diseases
- The organs affected by each disease
- To understand the role of vaccines and prevention

ABOUT THEMSELVES:

- To develop an understanding about the importance of prevention
- To develop responsible behavior and responsibility for self

Materials Needed:

- Member Handout 9, Cow's Respiratory System
- Member Handout 10, Cow's Gastrointestinal Tract
- Member Handout 11, Cattle Diseases
- Vaccines and/or vaccine containers
- Play money (approximately \$1,000 for each member)
- Sheets of cardboard, 3" × 5" cards or pieces of paper

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

The importance of dairy animals remaining healthy can not be over-emphasized. Unhealthy heifers will not grow, develop, and will not produce up to their potential. Therefore, it is important to be able to recognize when your animals are not feeling well. One important step is becoming familiar with the names of various diseases and where they occur.

We will discuss the diseases in the order they are drawn from the stack of cards because you never know when a disease might occur.

As diseases are drawn, we will see if you can identify the correct vaccine and where in the cow's body this disease might appear.

How and where is the vaccine given? (Note: Check container labels.)

These organs make up the respiratory system—or breathing center. Just like humans get pneumonia, so do cattle but it can be caused by other diseases like: IBR, BVD, PI-3, BRSV, *pasteurellosis* and *haemophilus*.

Leader Notes

Write the names of the various diseases to be studied on one side of the cards. Some of the more prevalent diseases in your area may be written on two or three in the stack, while less prevalent ones may only be written on one card. Leave some cards blank. Shuffle the cards and leave them face down so no one can see what's on them. This stack of cards is the "Disease" stack.

Write the names of various vaccines or diseases they prevent on one side of a group of cards. Make sure there are enough cards so that each member can

WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES

Leader Notes

Pass out Member Handout 9, Cow's Respiratory System.

Show the lungs and trachea (windpipe). Show the "Disease" cards labeled with these diseases.

Pass out Member Handout 10, Cow's Gastrointestinal Tract.

Show "Disease" cards for these diseases.

Show the pinkeye card.

Show the cards for these diseases.

Show the card for this disease.

Show the cards for these diseases and place them in a pile labeled "Viruses."

Show the cards for these diseases and stack them labeled "Bacteria."

Show card for this disease and label it "Protozoa."

Pass around the bottles or packages of different vaccines.

Instructions for Vaccine-Disease Card Game are included in the text due to their length.

ACTIVITY

Those are probably strange names to you, but they are bad for your animals and must be prevented if there is a chance that they can get them.

This is the intestinal system. This system must be working properly in your dairy animal for it to eat and be able to digest its food. If she can't do that, then it won't perform well. There are some diseases that affect the intestinal system and cause severe diarrhea: BVD and *coccidiosis*.

Another common problem is pinkeye. It is actually an irritation or infection in the eye and if it gets bad enough, the calf may go blind.

The calf is made up of muscle. If a calf gets a muscular disease, it may not grow well, and it may even die. Two diseases that affect muscle are *blackleg* and *malignant edema*.

One disease that may affect many organs is *leptospirosis*. It mainly affects the urinary system, but every organ is important to the health of your animal.

Each disease must have a cause and there are three common causes for diseases. The first is **viruses**. This is the smallest of the three. Viruses may cause IBR, BVD, PI-3, and BRSV.

The next cause of diseases that we will study is **bacteria**. These are a little larger in size than viruses. Bacteria may cause *brucellosis*, *blackleg*, *malignant edema*, *pasteurellosis*, *haemophilus*, *leptospirosis* and *pinkeye*.

One more common cause of disease is **protozoa**. Although you must look through a microscope to see them, protozoa are the largest in size. *Coccidiosis* is caused by a specific protozoan.

Because we don't want our cattle to be sick, we need to protect them in some way. Vaccines are substances that mimic a certain disease. The vaccine causes the body to fight the disease, building up an immunity to it. If the animal is later exposed to the disease, it will be ready to fight it off and the amount of damage the disease can do will be lessened. By vaccinating our cattle for certain diseases, we can protect them from damage. One vaccine doesn't protect the calf from all diseases. Each disease has different causes and therefore different vaccines are needed.

To demonstrate the value of vaccines, we are going to play a card game.

Vaccine–Disease Game

Using play money, give each member \$600. Each person buys a calf for \$400 and feed at \$190. That leaves each with \$10 to purchase vaccines for their calf. The leader should set the prices for each vaccine. They may vary from game to game, but the total cost for all vaccines should total \$20 so that the members cannot buy all the vaccines for their calf. (For example \$2 per vaccine.)

ACTIVITY

The leader should hold the extra money and act as the “Bank.” Also the leader should hold the extra “Vaccine” cards and be sure each player has had a chance to pay for the vaccines wanted. Players do not have to buy vaccines, they can take their chances.

Stack the “Disease” cards face down in the middle of the group. After each member has bought the vaccines desired, each person draws two cards from the stack of “Disease” cards. The value of a healthy dairy heifer is \$795.

If a member draws a blank card, there is no discount in the value of the calf. If a card is drawn with the name of a disease for which the vaccine was bought, again there is no discount. But if a card is drawn with the name of a disease for which that member did not buy the vaccine, the value for that member’s calf is discounted (decreased) by \$100.

After each member has drawn two cards from the “Disease” stack and deducted any losses, determine the remaining value of each member’s animal.

SUMMARY

All of these diseases cause the animal to be sick. When sick, she doesn’t eat normally so she won’t grow and produce as she should. Vaccines are like an insurance policy, they decrease the amount of damage a disease will cause.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What are the names of some common diseases?
2. What causes these diseases? What organs are affected?
3. How can you help keep your animal healthy?

Process:

4. Which diseases seem to be best prevented by vaccines? Why?
5. What is significant about the cost of prevention compared to the cost of getting the disease?

Generalize:

6. What vaccinations have you had?
7. What are the potential problems if vaccines were not available?

Apply:

8. Before vaccines, contagious diseases were handled by quarantine or isolation. When might these methods be used today?
9. Can vaccinations be a requirement for international travel? Why or why not?

Leader Notes

Pass out Member Handout 11, Cattle Diseases as a review at the end fo the lesson and for putting in their record book.

Leader Notes

ACTIVITY

GOING FURTHER:

- Have a veterinarian as a guest at your meeting to answer questions.
- Visit a dairy farm and ask the dairy farmer about the vaccines used on the farm.
- See a physician or health clinic to ensure your health records are up to date.

REFERENCES:

Merck Veterinary Manual 6th ed. 1985

Authors:

Calvin Binns, D.V.M.

Deborah K. Lyons-Blythe, former County Extension Agent, Agriculture,
Kansas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State
University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State
University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas
State University

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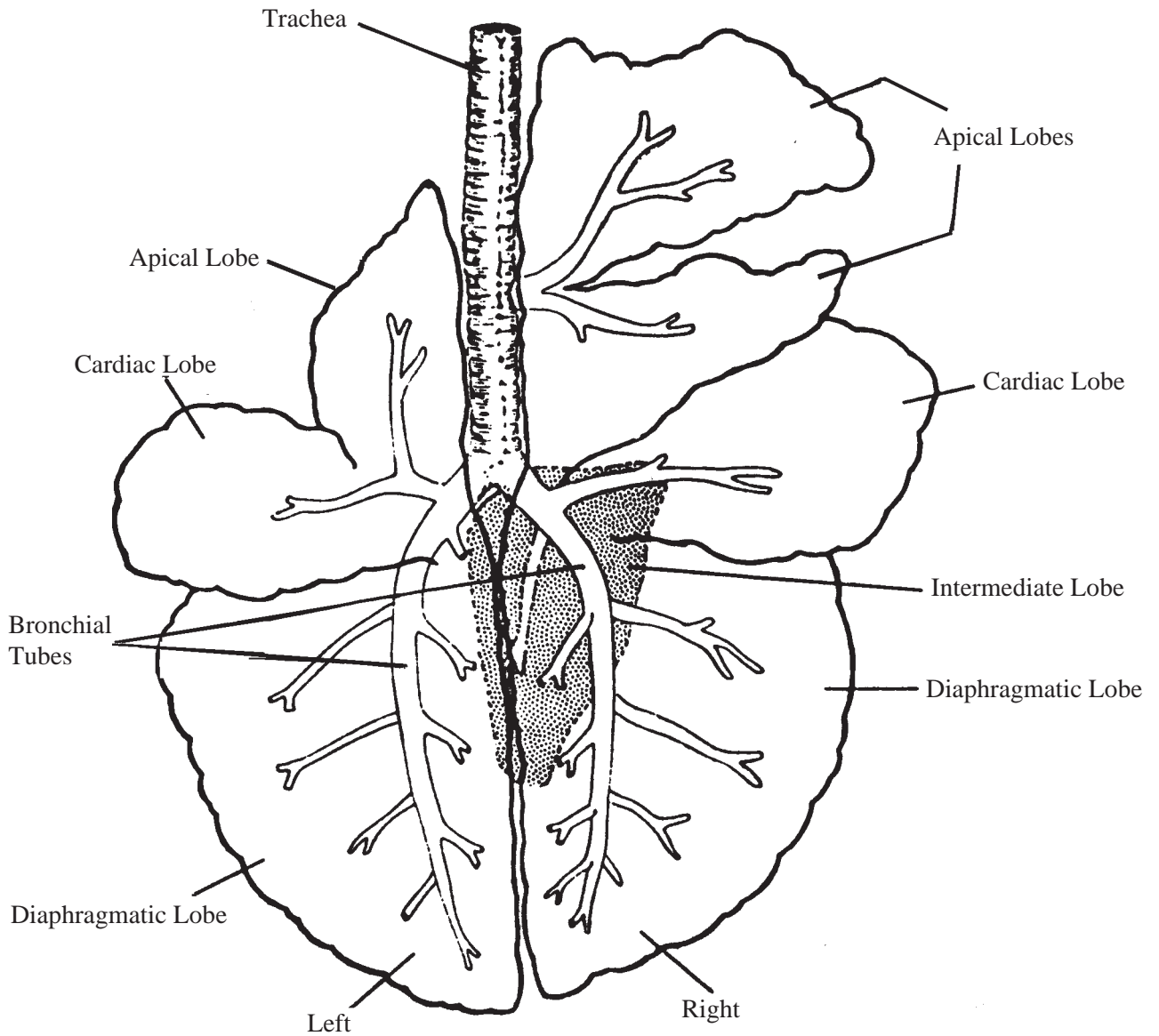
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WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES
DAIRY CATTLE, LEVEL III
Member Handout 9, Cow's Respiratory System



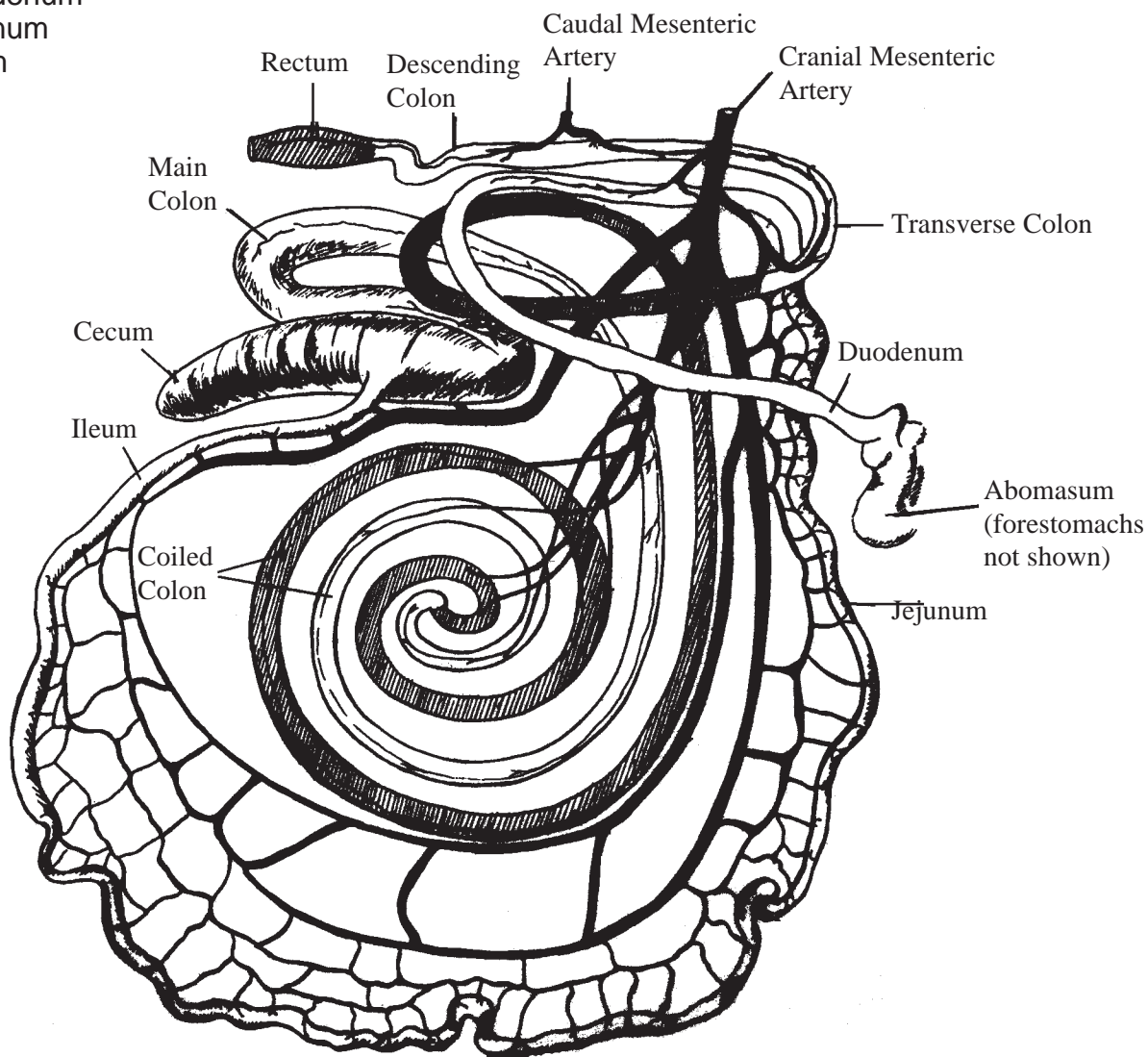
WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES

DAIRY CATTLE, LEVEL III

Member Handout 10, Cow's Gastrointestinal Tract

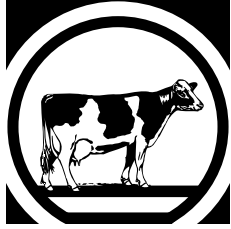
Small Intestine:

1. Duodenum
2. Jejunum
3. Ileum



WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES
DAIRY CATTLE, LEVEL III
Member Handout 11, Cattle Diseases

Name	Location	Cause
IBR	Respiratory System	Virus
PI-3	Respiratory System	Virus
BRSV	Respiratory System	Virus
Pasteurellosis	Respiratory System	Bacteria
Haemophilus	Respiratory System	Bacteria
BVD	Intestinal System	Virus
Coccidiosis	Intestinal System	Protozoa
Pinkeye	Eyes	Bacteria
Blackleg	Muscle	Bacteria
Malignant edema	Muscle	Bacteria
Leptospirosis	Urinary System	Bacteria



Common Cattle Diseases: Foot Rot

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- How foot rot infection in cattle occurs
- How to control and treat foot rot

ABOUT THEMSELVES:

- Understand how prevention means better health
- Understand how immediate treatment lessens problems

Materials Needed:

- Picture of a cow with foot rot (or live animal with foot rot)
- Picture of wet, sloppy and muddy lots or pens (or visit a muddy, sloppy pen)
- Picture of dry, clean and sanitary pens or lots (or visit a dry, clean pen)
- Chalkboard and chalk or flip chart and marker

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Leader Notes

Keeping dairy cattle healthy is our job. It not only benefits them, because they feel well and eat well, but they also grow and produce better when they are healthy. So even a small problem can become a big problem for dairy producers. Foot rot is one of those problems. It can easily be avoided and is easily treated, but can become a big problem if left untreated.

Foot rot is caused by a complex of bacteria that enter the foot through a cut or abrasion. Foot rot makes the skin swell and turn red just above the hoof, between the toes and in the bulb of the heel of the animal. This swelling and soreness makes the animal limp.

Foot rot occurs most often when cattle are exposed to wet, sloppy, muddy pens. The bacteria multiply quickly under these conditions and if an animal stands in these conditions for a long time, the chances of contracting foot rot are increased.

The bacteria that cause foot rot are still present in dry conditions such as a well drained lot or in a pasture, but there are not as many and it is more difficult for the bacteria to get into the foot. So the **best prevention** of foot rot is to make sure the pens are clean and dry, and to maintain your calf's good foot condition with proper trimming. A foot bath located in an area where the cows have to walk through it as they leave the milking

Show picture of a cow with foot rot.

Show a muddy lot (or picture of a lot).

Show a clean, dry lot (or picture of a lot).

Leader Notes

List on flip chart or make a table of foot rot preventions, symptoms and treatments. Have members include this table in their record book.

ACTIVITY

parlor can help prevent foot rot and other foot sores. The foot bath should be made up from a solution containing 2 pounds of copper sulfate in 25 gallons of water.

But, even with prevention, some animals will get foot rot anyway. Dairy animals with foot rot will have swelling and reddening of the foot area, causing it to limp. When these symptoms appear, contact your veterinarian for treatment recommendations. Without treatment, the infection may move to the joint cavity, resulting in fever, weight loss and even death. Any class of cattle can get foot rot: cows, bulls, heifers, steers, etc. But one animal cannot get it from another, except when the bacteria are in the ground and invade the other's feet.

Even though there is a treatment, it must be emphasized that the best way to avoid problems with foot rot is to prevent it!

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What is foot rot?
2. How does an animal get foot rot?

Process:

3. How can you prevent or treat cattle with foot rot?
4. How is maintaining pens related to your calf getting foot rot?

Generalize:

5. What are human diseases or problems that affect our feet?
6. What should you do if you step on something that punctures your skin?
7. Generally, which is easier, prevention or treatment? Why?

Apply:

8. What are other examples of how little problems can become big ones if untreated?
9. What preventative goals or priorities will help you maintain better health?

GOING FURTHER:

- Visit a local dairy after a wet period and see what incidence of foot rot they have and how they treat it.
- Visit a local veterinarian about diagnosis and prevention of foot rot.

ACTIVITY

Leader Notes

REFERENCES:

Kansas Beef Cattle Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas

Authors:

Terry Weedon, former Extension Assistant, Animal Sciences and Industry, Kansas State University
Deborah K. Lyons-Blythe, former County Extension Agent, Agriculture, Kansas

Edited by:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

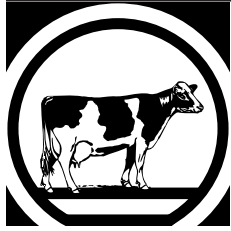
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Understanding the Mammary System

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The anatomy of the mammary system and its relation to the process of milking and mastitis control
- The physiology of the mammary system and its relation to milk secretion and the process of milking

ABOUT THEMSELVES:

- The importance of relating and working for a healthy society

Materials Needed:

- Member Handout 12, Mammary System Anatomy and Physiology
- Lactating dairy cow
- Chalkboard and chalk or flip chart and markers

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

All mammals produce enough milk to feed their young, but dairy cows have been bred and selected for many generations to produce much larger quantities of milk. This process has led to the development of a very specialized system—the mammary system or udder. Some cows today can secrete and store as much as 75 pounds of milk in a twelve-hour period. Therefore, the mammary system is designed to: (1) withstand the wear and tear of everyday activities, (2) convert nutrients from the blood stream into milk, and (3) be milked out rapidly at least two times each day. Understanding how the mammary system is designed (anatomically and physiologically) is important for understanding milking procedures and mastitis control. (These two topics are discussed in other lessons.)

Gross Anatomy

The udder is referred to as a gland because it secretes milk into a duct system. Actually the udder is composed of four individual glands since each quarter is a separate gland. The udder is obviously outside the body cavity and is attached by bands of connective tissues called ligaments. The obvious reason for being located outside of the body cavity is for nursing by the calf.

The ligaments supporting the mammary system have a very important function in mastitis control. This support system attempts to hold the udder close to the body wall and as high as possible to keep the udder clean by minimizing contact with soil and manure.

Leader Notes

This lesson is intended to be taught before the one on Milking Procedures. Conduct this lesson during a field trip to a local dairy if possible.

Pass out Member Handout 12, Mammary System Anatomy and Physiology. Discuss Figure 1.

After studying the figures, see if members can locate major ligaments, arteries and veins on a live cow.

Leader Notes

Discuss Figure 2. Identify the parts on the real cow.

Discuss Figure 3.

Identify arteries and “milk vein” on a real cow.

Review all the parts of the udder again on cow and handout.

Discuss Figure 4.

ACTIVITY

The major support of the udder is by the median (middle) suspensory ligament which divides it into left and right halves. This ligament attaches to the pelvis and its strength is observed by the amount of cleavage between the two halves. Udders with strong median suspensory ligaments will also exhibit the teat hanging straight down when full and pointed toward the center when empty. Cows with weak suspensory ligaments will have deep pendulous udders and the teats will usually strut outward. It is difficult to prevent mastitis in pendulous udders because they are hard to keep clean and they are easily injured.

The other source of support is from the web-like lateral ligaments surrounding the outside surface of the glands which attach to the belly wall. Strength of attachment from these ligaments is evident if there is little separation between the belly wall and the fore udder.

Anatomy of the teats is related to mastitis prevention and ease of milking. Cows have been selected for teats that are the proper size for convenient machine milking. Exceptionally large or small diameter teats do not fit properly in today’s teat cup liners.

The hole in the end of the teat which milk passes through during milking is called the teat canal. It is surrounded by the sphincter muscle which regulates how easily the teat canal can be opened. Easy milking cows have weak sphincter muscles while hard or slow milking cows have strong ones. Cows with weak sphincters may be seen dripping milk as milking time approaches. Easy milking cows have been selected because they require less time for milking. However, teats with strong sphincter muscles tend to close tighter and prevent the invasion of mastitis-causing bacteria.

The teat canal is lined with a waxy material, keratin, which helps seal it to prevent bacteria from entering the quarter. Care should be taken to avoid damaging the keratin lining when infusing teats with mastitis treatments.

Since the teat canal is the only opening through which bacteria can gain entrance into the mammary system, care should be taken to sanitize teat ends after every milking. This is why post-milking teat dipping is recommended—it sanitizes the teat canal.

Blood is supplied to the mammary system in large quantities by arteries. Most of the arteries are internal, but one may be seen entering the upper part of the rear udder. Blood is returned to the heart by veins. One large vein, sometimes referred to as the milk vein, can be seen leaving the fore udder along the belly wall. About four hundred quarts of blood must pass through the udder to produce one quart of milk.

Anatomy of Milk Secreting Tissue

Understanding the anatomy of the milk secreting tissue system is important because it is related to milk let-down and milk-out.

ACTIVITY

Milk secreting tissue has the appearance of a sponge and is located in the upper part of the udder. The dense appearing part of a sponge is similar to the tissue containing the milk secreting units called alveoli. The porous areas correspond to milk collecting ducts of the secretory tissue. Each alveolus is connected to a duct through which milk is drained. These ducts connect with larger ducts so that the alveoli from the top part of the udder are drained to the bottom part and eventually into the teats. About 60% of the milk produced is stored in the alveoli while the remainder is in the duct system.

Massaging the teats while prepping a cow for milking causes the pituitary gland to release oxytocin into the blood stream to be carried to the mammary system. This causes let-down when the muscle cells contract and squeeze milk from the alveoli. When let-down has occurred, pressure inside the mammary system will be about doubled. Externally this response can be observed by the teats becoming turgid and some cows will leak milk. This response occurs about one minute after the cow was initially stimulated by the prepping procedures.

After about five minutes, the concentration of oxytocin is lowered as blood is being circulated through the liver. Therefore, maximum let-down lasts for a period of about five minutes. This means that there is a period of about five minutes when maximum milk harvest can be accomplished.

As the concentration of oxytocin is reduced, the muscle cells surrounding alveoli begin to relax and the pressure inside the mammary system is lowered. This causes milk to be retained in the alveoli. Milk-out will not be as complete if let-down occurs too long before the milking process begins. Research has demonstrated that approximately 20% of the milk will be retained in the mammary system if milking is delayed as long as five minutes after let-down. Therefore the milker unit should be attached about one minute after prepping begins to accomplish complete milk-out.

The opposite of let-down can occur if cows are frightened or in pain at milking time. Holding-up is due to adrenalin being secreted into the blood stream which causes muscle cells surrounding alveoli to relax. When this happens, only about 40% of the milk can be removed from the udder because the other 60% is contained in the alveoli.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What was the most interesting part of the mammary system? Why?
2. What is meant by milk let-down? Hold-up? How do both of these occur?

Process:

3. What is the significance of “prepping” a cow before milking?

Leader Notes

Discuss Figure 5. Observe an actual prepping procedure at a local dairy.

Discuss Figure 6.

Review parts of the udder and milk letdown by having members work in small groups to list how milk is produced. Arrange proper sequence of milk let down on flip chart or chalkboard.

This review is essential due to the importance of the process and amount of information in this lesson!

Leader Notes

ACTIVITY

4. Why is teat dipping after milking so important?
5. Why is it important for the cow to be calm, comfortable and relaxed at milking time?

Generalize:

6. Why is it important to treat all animals with respect and care?
7. What personal hygiene practices are important in your life? Why?

Apply:

8. What are the public health issues in your community? How are they being solved?

GOING FURTHER:

- Visit a dairy at milking time to observe some of the anatomical features of the mammary system. During the milking process, observe milk let-down.
- Research and discuss a current public health issue.

REFERENCES:

Author:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Program, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

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UNDERSTANDING THE MAMMARY SYSTEM

DAIRY CATTLE, LEVEL III

Member Handout 12, Mammary System Anatomy and Physiology

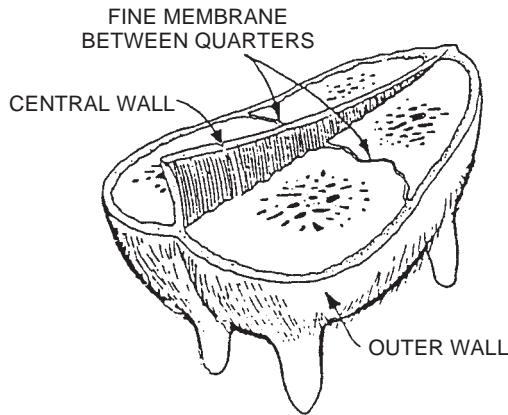


Figure 1. A cutaway of a cow's udder. Note the udder is divided into four distinct quarters by membranes and into left and right halves by the median suspensory ligament.

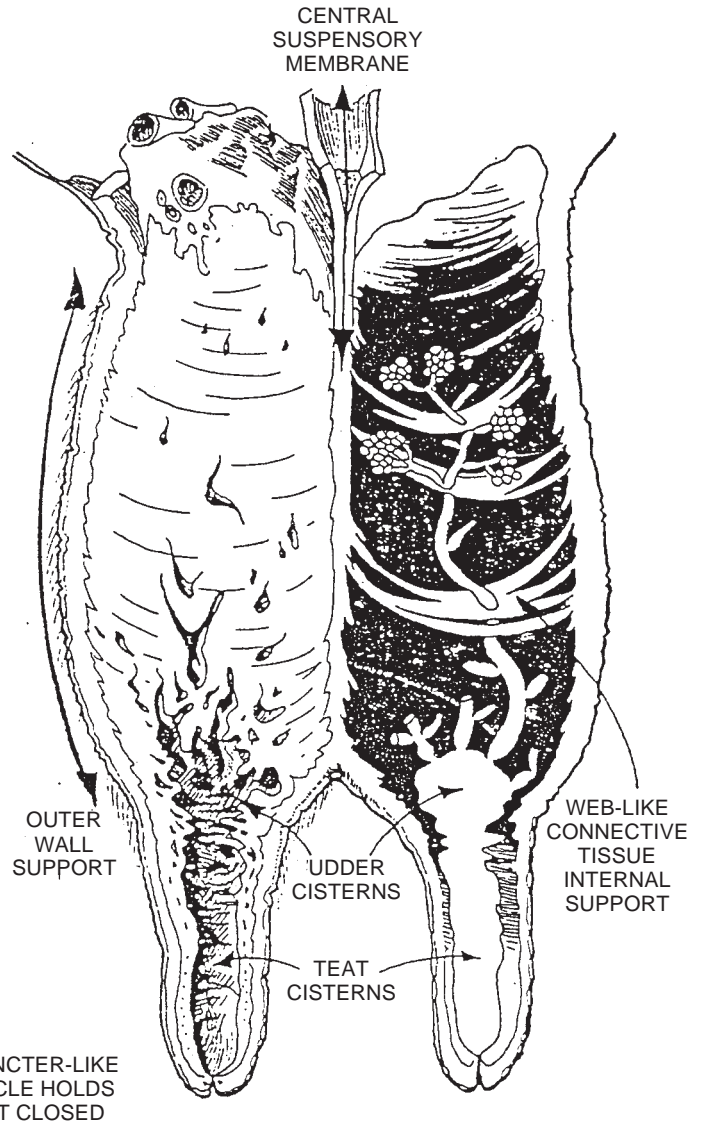


Figure 2. A cutaway of a cow's udder showing the rear quarters. The main support is the central suspensory membrane (median suspensory ligament).

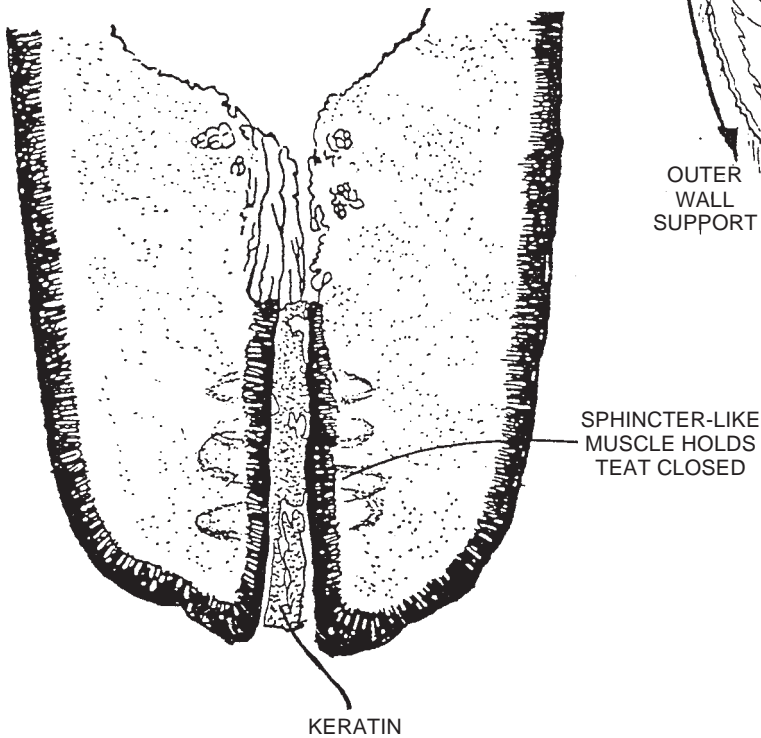


Figure 3. A cutaway of a cow's teat. Note the circular sphincter muscle surrounding the teat canal which is lined with keratin.

UNDERSTANDING THE MAMMARY SYSTEM

DAIRY CATTLE, LEVEL III

Member Handout 12, Mammary System Anatomy and Physiology, *continued*

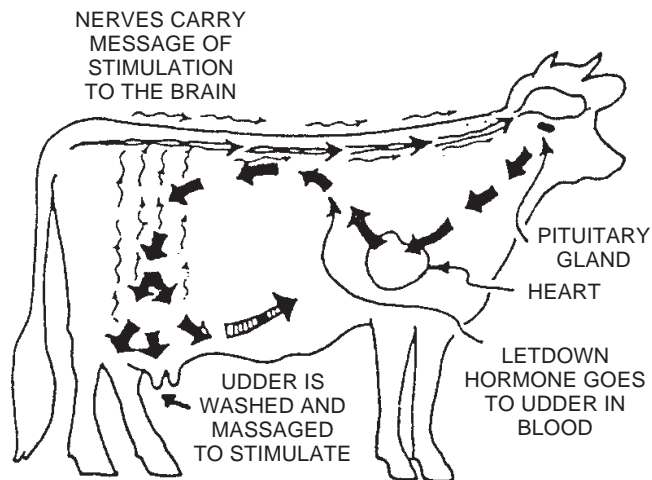
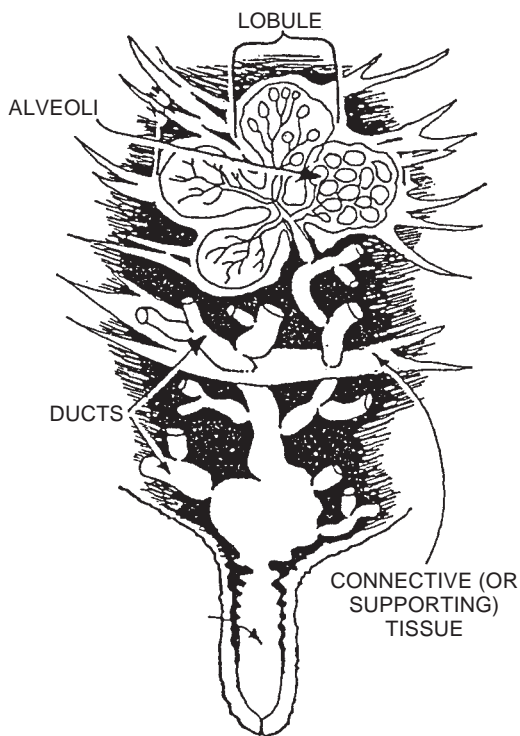


Figure 5. A diagram showing how the cow is stimulated to deliver oxytocin to the mammary system for letdown.

Figure 4. A diagram of the secretory tissue of a cow's udder.

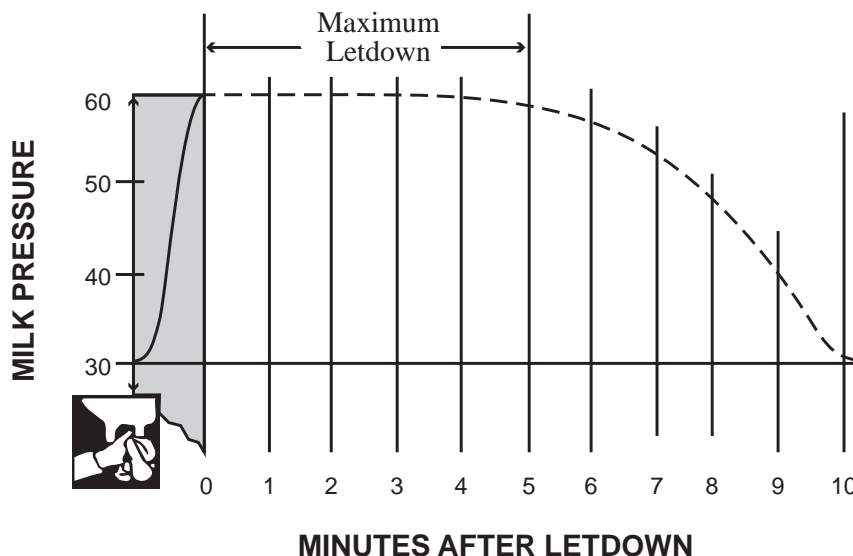
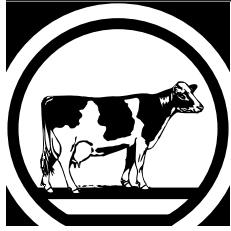


Figure 6. A graph showing the pressure inside the mammary system before and after stimulation for milk letdown. Note how pressure diminishes after 5 minutes.



Milking Procedures

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- The procedures for good milking
- The procedures for good sanitation

ABOUT THEMSELVES:

- The importance of paying attention to details
- The importance of good sanitation.

Materials Needed:

- A milking parlor to milk cows
- Member Handout 13, Milking Procedures
- Notecards for each member

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The success of a dairy farm can be closely related to how cows are milked. The goals for milking should be to get cows milked out completely in a manner that will minimize the spread of mastitis. Good procedures can result in 2000 pounds more milk production per cow per year which contains less than 200,000 average somatic cell count.

Timing and sanitation are the most important factors in good milking procedures. Cows are stimulated for milk let-down during the process of prepping, and the process of prepping can have a great impact on sanitation.

Milk let-down begins by stimulating the mammary system while preparing cows. At least 30 seconds of prep time is required for maximum stimulation. Begin prepping by squirting two streams of milk from each quarter. This is the best stimulation for let-down, and the milk can be examined for abnormal appearance which indicates clinical mastitis.

Next, predip or spray the teats with a teat dip and vigorously massage to clean the teats. Special attention should be given to rubbing the teat end to clean around the teat canal. In some cases, additional dip may have to be applied to get the teats clean. If the teats are exceptionally dirty, a minimum amount of water may have to be used. However, avoid using water to wash teats whenever possible because water can cause sanitation problems.

Leader Notes

This lesson should be taught on a dairy farm so that milking techniques can be demonstrated. Have members watch a demonstration and write questions on the cards or list procedure sequence.

If cows are available, let each member prep a cow.

Be sure all members know what is in teat dip, what it does and why it is used.

Leader Notes

ACTIVITY

After the teats have been thoroughly cleaned, dry with a single service paper or cloth towel to remove excess predip. It is important to remember that the teats must be completely dry and the towel should never be used on more than one cow. If water is used for cleaning, more than one towel may be required to remove the excess water from the udder and teats.

The milk let-down hormone, oxytocin, reaches the mammary system about one minute after prepping is begun. To take full advantage of let-down, the milker unit should be attached as soon as prepping is completed. Research has demonstrated that waiting longer can reduce milk-out by as much as 20 percent. If cows have been properly stimulated and the milker is attached when let-down occurs, most cows can be milked in less than five minutes.

While milking, listen for squawking or air leaks which indicates liners are slipping. Liner slips transmit mastitis from one quarter to another. If a liner slips, try to prevent the air leak by lifting the teat cup higher onto the teat.

Remove the milker unit when milk-out is complete. If automatic detachers are not being used, always shut off the vacuum before removing the unit. Pulling a milker unit off when vacuum is still on the teat can damage the teat canal.

As soon as convenient, dip or spray the teats. If teats are sprayed, be sure the entire teat is covered. During extremely cold weather, blot the teats dry before turning cows outside. Dipping is extremely critical for good sanitation because it sanitizes the teat canal. Research has shown that post milking teat dipping will reduce new infections by 50 percent.

Another practice that will enhance sanitation is to have fresh feed available as cows leave the parlor. This encourages cows to remain standing while the teat canal is still somewhat open.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What was the hardest part of milking cows? The easiest?
2. How long did it take for one cow to be milked? How long should it take?

Process:

3. How do you ensure that no bacteria passes from one cow to another?
4. Why is post milking teat dipping so important?
5. Why should you listen for squawking or air line leaks?
6. Why is efficiency so important in a dairy operation?

Use Member Handout 13, Milking Procedures as a review. Cut out the eight steps to see if members can arrange them in order.

ACTIVITY

Leader Notes

Generalize:

7. When is efficiency important in your life? Why?
8. When is sanitation important in your life? Why?

Apply:

9. How are the issues raised in this activity useful to the dairy foods consumer?

GOING FURTHER:

- Whenever possible, visit dairy farms at milking time and compare how different dairy farmers milk their cows.

REFERENCES:

Author:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Program, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

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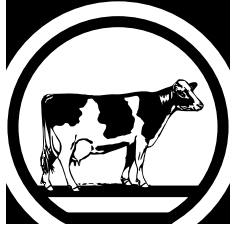
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MILKING PROCEDURES
DAIRY CATTLE, LEVEL III
Member Handout 13, Milking Procedures

Proper milking consists of fast, complete milk-out and good sanitation which leads to higher production of high-quality milk. Milk let-down begins by stimulating the mammary system while preparing cows for milking. The stimulus causes the milk let-down hormone, oxytocin, to be released which results in increased pressure in the mammary system. About 30 seconds of massaging the teats is needed for complete let-down. The milker unit should be attached within one minute after prepping commences to take advantage of oxytocin for fast, complete milk-out. About five minutes following stimulation, the effects of oxytocin diminish and milk-out is incomplete. These are recommended procedures for good milk let-down and proper sanitation.

1. Squirt two streams of milk from each teat. Check for abnormal appearance, such as, clots, flakes, color or wateriness.
2. Predip or spray with teat dip and massage to clean teats. Thoroughly rub end of teat to clean around teat canal.
3. Thoroughly dry teats with single service paper towel or cloth towel to remove excess predip. Never use the same towel on different cows.
4. Attach milker unit as soon as let-down is evident - usually within 30 seconds after prepping.
5. Keep liner slippage to a minimum. Listen for liners that are squawking or leaking air.
6. Remove milker unit when milk-out is complete, if detachers are not used. Be sure vacuum is shut off before the unit is removed.
7. Dip teats or spray as soon as convenient after the unit is detached. During cold weather, blot teats dry before cows leave the parlor.
8. Encourage cows to stand after milking by offering fresh feed outside the parlor. This helps control mastitis.



Understanding a Milking System

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- How a milking system works
- The importance of a functioning milking machine
- The importance of sanitation

ABOUT THEMSELVES:

- The importance of taking care of equipment and providing regular maintenance
- What sanitary conditions mean to them

Materials Needed:

- A milking system
- Member Handout 14, Components of a Milking System

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The milking machine is a labor saving device that is needed on all dairy farms for harvesting milk. It is the only piece of mechanical equipment used on the farm that works on living tissue. Therefore, it is critical that the milking machine operates properly.

The basic function of a milking machine is to apply a vacuum to the teats to remove the milk, in a manner that will not injure them. The milking machine must transport the milk from the cow to the bulk tank for cooling. A modern milking machine will also remove itself from the cow when all the milk has been obtained (to milk out).

The components of a milking machine are: (1) vacuum pump and distribution tank, (2) vacuum supply lines, (3) vacuum regulator, (4) milker unit or claw, (5) pulsator, (6) milk transport lines and (7) milk receiving equipment.

Vacuum pump and distribution tank—is the source of vacuum that pulls milk from the teats and is used by the pulsator to cause the teat cup liners (inflations) to massage the teats. The distribution tank is needed to distribute vacuum to the supply lines and to provide a reserve supply of vacuum when there is a big demand.

Vacuum supply lines—are needed to carry vacuum from the vacuum distribution tank to the milker unit and pulsator.

Leader Notes

This lesson is intended to be conducted on a dairy farm where the different components of the milking system may be observed.

Pass out Member Handout 14, Components of a Milking System. Observe each of the components that are shown in the handout. Discuss the function of each of these components. Encourage labeling of additional parts that they see.

Leader Notes

ACTIVITY

While the milking system is running, let each member insert their thumb into a teat cup liner to feel the sensation of the milking vacuum and massage by the liner.

Vacuum regulator—regulates the level of vacuum in the distribution tank to provide enough vacuum for good milking but without having excessive vacuum on the teats.

Milker unit—attaches to the teats via the teat cups and teat cup liners. Milk from the four liners is collected in the unit where it is removed by the milk hose. The teat cup liners massage the teat when the pulsator lets atmospheric pressure into the space between the teat cup and the teat cup liners. Since there is continual vacuum on the inside of the liner and atmospheric pressure on the outside of the liner, the teat cup liner closes and massages the teat. This process is essential to prevent tissue fluids from accumulating in the teat ends and causing serious trauma. When the pulsator applies a vacuum to the space between the teat cup shell and liner, the liner opens and milk is ejected from the teat ends due to the vacuum on the inside of the teat cup liner.

Pulsator—alternately applies vacuum and atmospheric air pressure to the space between the teat cup and teat cup liner.

Milk transport lines—include the milk hose coming from the milker unit to the pipeline and the pipeline. This system must carry milk away from the cow and vacuum to the milker unit.

Milk receiving equipment—collects milk from the pipeline in a receiver jar until the milk pump turns on and pumps the milk to the bulk tank. This equipment is needed so that a continual vacuum is applied to the milk line without atmospheric air pressure entering when the receiver jar is emptied.

It is critical that the milking system is operating correctly. Completeness of milk out and mammary system health can be affected by the milking system. Therefore, the milking system should be evaluated at least every six-months to determine that the milking vacuum level is correct and the pulsators are working correctly. In addition, the teat cup liners should be replaced after milking 1000 cows/milker unit.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What did you see about the milking system that impressed you the most?
2. How did it feel to have your finger in a milker (if you did that)?
3. Does this system appear easier or harder than milking by hand? Why?

Process:

4. How important is good maintenance for the milking system?

ACTIVITY

Leader Notes

5. In terms of sanitation, how does this system compare to hand milking?
6. In terms of cost, which system do you think is cheaper? Be able to defend your position.

Generalize:

7. What are other things you have or use that require regular maintenance to function properly?
8. What are other products you can name or discuss where sanitation is of major importance?

Apply:

9. What will you do differently in the future as a result of this discussion on maintenance and sanitation?

GOING FURTHER:

- If a dairy farmer is milking 100 cows twice daily with 10 milker units, how often should the teat cup liners be replaced? A: every 50 days.
- Visit a milking equipment dealer and ask how a milking system is evaluated.

REFERENCES:

Current Concepts of Bovine Mastitis, National Mastitis Council, 1840 Wilson Blvd., Arlington, Virginia 22201

Author:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University

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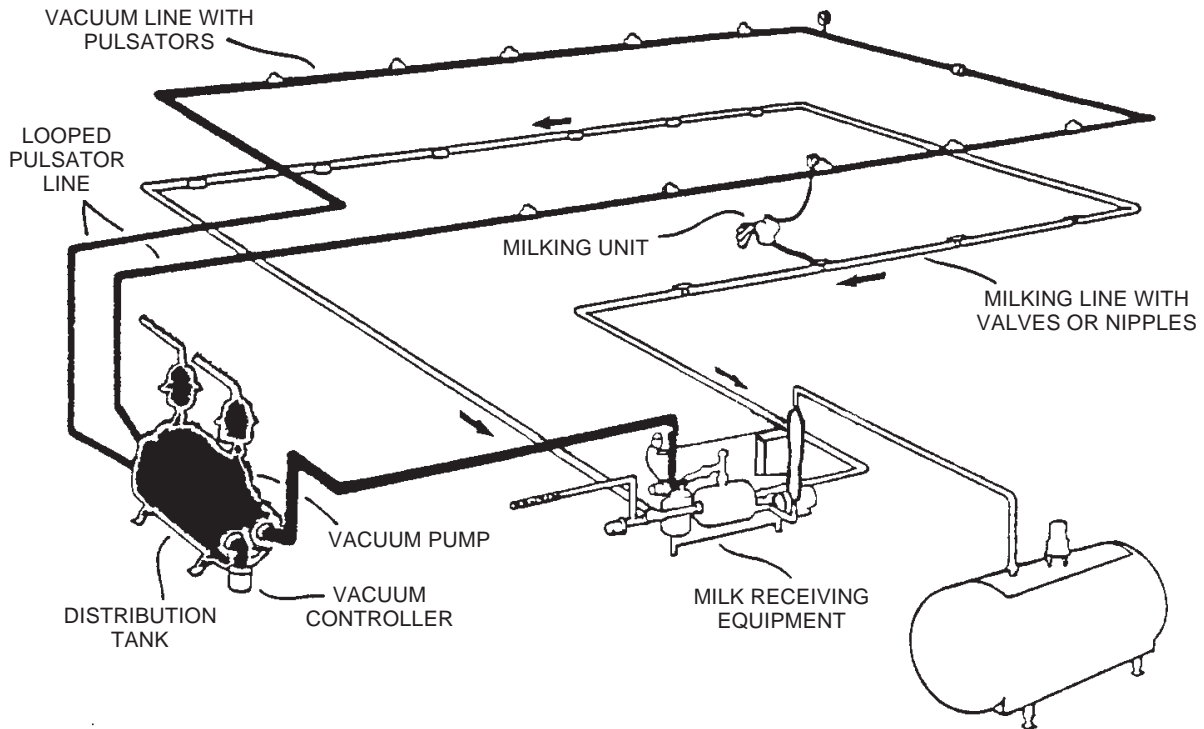
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UNDERSTANDING A MILKING SYSTEM

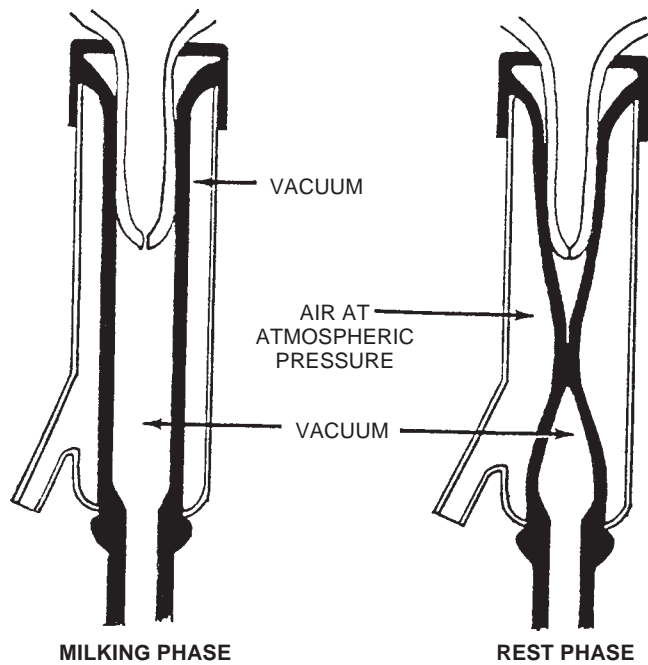
DAIRY CATTLE, LEVEL III

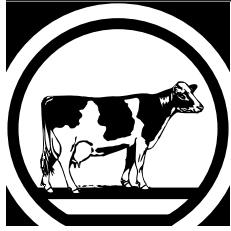
Member Handout 14, Components of a Milking System

LOW LINE PIPELINE SYSTEM FOR PARLORS



PULSATOR ACTION ON THE TEAT CUP LINERS





Dairy Cattle Identification

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- Four animal identification methods
- Why animal identification is used
- What types of identification are needed for different situations

ABOUT THEMSELVES:

- Their personal identities
- Why people have specific identification
- Four ways people are identified

Materials Needed:

- Chalkboard and chalk, newsprint and markers
- Blank paper and pencils for members
- Actual identification equipment (branding irons, tattoo set, ear tags, neck chain, etc.)
- Activity Sheet 9, Dairy Cattle Identification Summary
- Member Handout 15, Verified Identification Application Form
- Member Handout 16, Sample Verified Identification Application
- Member Handout 17, Sample Verified Identification Certificate
- Member Handout 18, DHIA - 205 Lifetime History of Individual Cow

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

IMPORTANCE OF IDENTIFYING ANIMALS

A permanent means of identifying cattle to establish ownership has been used since the early days in history. Many cattle were branded or tattooed. Ear notching and branding were among the early methods used in the cattle business followed by tattooing and tagging.

Today's dairy farmer needs two methods to identify their cattle; one for permanent identification and one for use in day to day management. Permanent identification includes those methods which can not be changed, such as, photographs, sketches, and tattoos. Identification needed for day to day management includes methods whereby the animals can be visibly identified at some distance, such as ear tags, neck chain numbers, and brands.

Leader Notes

Hand out Activity Sheet 9, Cattle Identification Summary to be used as a listening/note-taking activity or as a method of summarizing at the end. Advantages and disadvantages of each identification could be listed on chalkboard or newsprint as they are discussed. Ask members for input before listing.

Leader Notes

Pass out Member Handouts 15, 16 and 17, Verified Identification Application Form, Sample Verified Identification Application and Sample Verified Identification Certificate.

Discuss each part of the form. Look at the actual samples from the members or producer.

Pass out Member Handout 18, DHIA-205 Lifetime History of Individual Cow.

ACTIVITY**Permanent Identification**

Registered and permanently identified grade dairy cattle, such as those enrolled in the Verified Identification Program (VIP), are identified by photograph, sketch of the color markings, or tattoo. These identification methods can not be changed but are not a very convenient means to identify animals on a day-to-day basis. Animals that are officially vaccinated for brucellosis are tattooed in the ear to identify them as officially vaccinated. These animals are also eartagged with a metal tag imprinted with a non-duplicating number to indicate where the animal originated. The tattoo is a permanent way to indicate that the animal has been vaccinated, but the animals identity can be lost if the ear tag is lost.

Purebred animals can be permanently identified (registered) in their breed association by providing sketches of the color markings or photos in the broken colored breeds or tattoos with solid colored breeds. Animals not eligible for registration (grades) may be permanently identified through the Dairy Herd Improvement Association's Verified Identification program. Either system permanently identifies the animal and their sire and dam are listed. Either of these systems has provisions for transferring ownership when an animal is sold.

The Dairy Herd Improvement Association also provides a convenient permanent identification system with the lifetime history page (DHIA-205 Lifetime History of Individual Cow). This page has space for sketching the color markings or attaching photos. In addition, space is provided for a lifetime history of the animal. These forms of identification are specific for dairy animals.

Visible Identification

Some means of identifying animals in dairy herds is needed so that animals can be easily identified when in the pasture, lots, or barns. The method used should provide a means whereby animals can be identified at some distance without having to refer to the permanent identification. A visible identification system will usually use a name or number system that is carried on the animal by means of a plastic ear tag, neck chain, freeze brand, or paint brand.

The visible identification system should refer back to a permanent identification. Then, if the visible identification is lost, the animal can still be identified by referring to the permanent system.

Visible identification is especially useful when referring to certain animals at milking time, or identifying animals that need special care such as: breeding, calving, drying off, vaccinations, etc. Some members of the family may be able to recognize every animal in the herd without using visible identification, but misunderstandings about the identification of animals can be avoided with visible identification. Visible identification should commence soon after a calf is born to avoid the possibility of forgetting who the calf is.

ACTIVITY

Leader Notes

Plastic ear tags are a very convenient method for identifying newborn calves. The animal's name or number can be put on the front side of the tag and the dam's number, month and year born on the back side.

Show several brands of popular ear tags and the applicator used by each.

There are several ingenious systems for numbering new animals. A disadvantage with ear tags is they are hard to see in many milking parlors, and they may be lost.

Neck chains are used in many herds, especially in the milking herd. It consists of a chain or plastic rope with a plastic or metal tag attached. This system can also be used to attach a magnet or computer feeder transponder for feeding the cows. A computer feeder transponder electronically signals the self-feeding grain system as to which cow is eating and automatically provides the correct amount of feed for that cow. This system is more visible in some parlors than ear tags. However, neck chains have to be adjusted for size if used on heifers. Also, animals tend to get entangled in fences or brush in pastures.

Brands, such as, freeze or paint brands are used in some herds to avoid using ear tags or neck chains. Brands, if well done, are easily visible, but are rather time-consuming to apply. Freeze brands must be applied to dark-colored hair, while paint brands must be renewed two or three times each year.

Computer Identification will likely be used in the future. With this system, a silicon chip can be implanted under the skin and can be read by scanning the area of implant. The chip would contain a non-duplicating number similar to a Social Security number.

Review using Activity Sheet 9, Dairy Cattle Identification Summary. Remind members to place this sheet plus the other handouts in their record books.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What methods of cattle identification have you seen? Which do you prefer? Why?

Process:

2. If you've ever had cows, what were some problems you've had with identification?

Generalize:

3. What are some ways you can prove your identity?
4. What people identifiers are permanent?
5. What people identifiers are used most commonly on a daily basis?
6. How are other items that you use identified?

Leader Notes

ACTIVITY

Apply:

7. Why do you think identification systems are important?
8. What identification systems do you plan to use in the future? Why?

GOING FURTHER:

- Plan a field trip to a dairy to observe their identification system.
- Have blank Verified Identification applications for members to complete on their own animals

REFERENCES:

Author:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Programs Kansas State University

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DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III
Activity Sheet 9, Dairy Cattle Identification Summary

Summarize the advantages and disadvantages of each of the following methods of identifying cattle.

Advantages	Method	Disadvantages
<hr/>	Sketch	<hr/>
<hr/>	Photos	<hr/>
<hr/>	Tattoo	<hr/>
<hr/>	Ear Tag	<hr/>
<hr/>	Neck Chain	<hr/>
<hr/>	Freeze Brand	<hr/>
<hr/>	Paint Brand	<hr/>

DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III
Member Handout 15, Verified Identification Application Form

DAIRY CATTLE IDENTIFICATION

For office use:

Application for a Verified Identification (VIP 2) 12-83

(Please use pencil or black ink)

____/____/____
 Mo. Day Year
Date of Application

 (1) Permanent Number(s) (Tattoo or Freeze Brand Only)

(2) Sex _____ (3) Barn Name or No. _____ (4) Mo. ____ Day ____ Year ____
 Birth Date

(6) Solid (7) Coat Color

 (8) Computer Control No.

NAME _____ (9) _____ (10) Eartag Number _____

Sire Name _____ (12) Breed _____ Sire No. _____ (13) _____

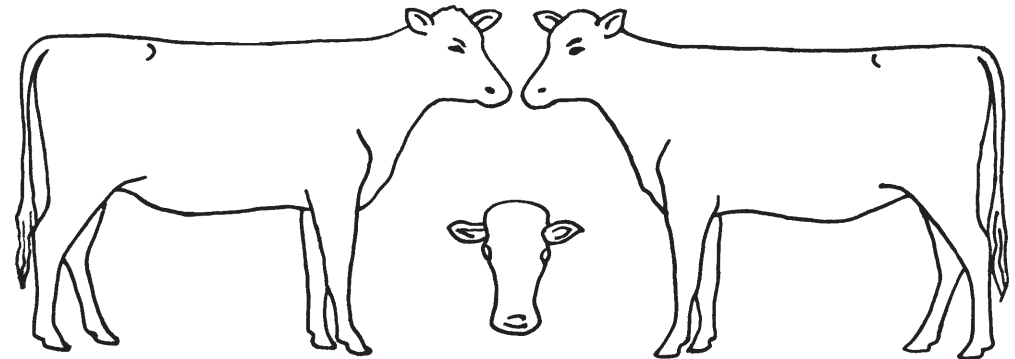
Dam Name _____ (14) _____ (15) Breed _____ Dam No. _____ (16) _____

Maternal Grandsire _____ (18) Breed _____ MGS No. _____ (19) _____

____/____/____
 (20) Mo. Day Year
 Date dam was bred
 Calved early (21) Long term (22)
 If pasture bred give dates the sire had access to the dam:
 From: ____/____/____ (23) Mo. Day Year
 To: ____/____/____ (24) Mo. Day Year

Don't complete the following line unless this is the first application from this herd, or a name, address or herd code change has been made.

 (25) Owner's Name (Print) (26) Address (Print) (27) City (Print) (28) State (29) Zip



I hereby certify the parentage and permanent identification of this animal as shown hereon to be correct and complete to the best of my knowledge.

I have personally inspected this animal and hereby verify the permanent identification as shown hereon to be correct and complete to the best of my knowledge.

 Owner

 Supervisor

 Number

 (30) Owner's Herdcode
 (32) Association (33) Proc. Center
 Twin (x), Triplet (3), Embryo Trans (E) (34)
 Twin with bull (35)
 Naturally polled (hornless) (36)

For office use:
 (37) Owner's Signature
 (38) Supervisor's Signature
 (39) Color Markings

 (40) Supervisor's Last Name (Print)
 Final sketches and signatures must be in ink.

100-Dairy Cattle, Level III

DAIRY CATTLE IDENTIFICATION DAIRY CATTLE, LEVEL III

Member Handout 15, Verified Identification Application Form, *continued*

Instructions for Completing the Application for a Verified Identification

Qualifications

State DHIA—The state DHIA must have sanctioned VIP before dairymen from that state participate.

Supervisor—A DHIA supervisor must be available that has been trained in the program.

Dairyman—The herd must be enrolled in the National Cooperative Dairy Herd Improvement Program on Official DHI, DHIR, Owner Sampler, AM-PM, Milk Record or any other record plan.

Animal—Eligible dairy animals are males or females of any breed whose birthdate, sire and dam are known.

Completing the application—Please read all of these instructions before beginning to fill out the application.

Leading zeros are used only in dates. Begin with the left position in all other fields.

1. Permanent Number(s)—A tattoo or freeze brand is **required** for identification of solid-colored animals only. Report the proper code and number. Codes used are: T—tattoo, L—left, R—right, E—ear, FB—freezebrand. A comma must be used to separate two permanent numbers. Example—TLE 216, TRE 84. Freeze brands should also be shown on the sketch.
 2. Sex—M is male, F is female.
 3. Barn Name or No.—A short name or number by which the animal is referred to must be provided.
 4. Birthdate—Use leading zeros in dates such as 01-09-76.
 5. Breed—

A – Ayrshire	G – Guernsey	P – Red Poll
B – Brown Swiss	H – Holstein	W – Red and White
D – Red Dane	J – Jersey	X – Mixed, Crossbred,
	M – Milking Shorthorn	or Other
 6. Solid—Place an "X" in this box only when the animal is entirely one color. If a color marking appears anywhere on the animal that spot or marking must appear as a sketch or photo.
 7. Coat Color—

B – Black	F – Fawn	R – Red	W – White
BN – Brown	M – Mahogany	RO – Roan	
- Use one, two or three positions for coat color, starting at the left. Example: **F** __ or **B W** __ or a **B N W** for Fawn, Black and White, and Brown and White. A "+" may be used provided it is one of the three positions such as **B + W**. **R+ W** etc. Report darker color first.
8. Computer Control No.—Assigned by some dairy record processing centers to heifers as they are born. Must be reported if assigned by your processing center.
 9. Name—A long name of up to 30 characters may be reported. Start in the left position and leave a space between words. The long name is optional.
 10. Eartag Number—Not required for animals under 2 years of age, but if present should be reported starting at the left. Report the uniform, state-coded eartag number for all animals over 2 years of age.
 - 11, 17. Sire And Maternal Grandsire Name—Names may be reported up to 30 positions in length. Do not report the name of A.I. sires as a complete file of these is already available. Names of A.I. sires will be printed automatically.
 - 12, 15, 18. Breed of Sire and Dam (and Maternal Grandsire if identified) must be reported.
 13. Sire No.—Acceptable sire numbers are VIP, registration, or uniform state-coded eartag numbers and must be reported. For A.I. sires the complete uniform NAAB code number may be reported.
 14. Dam Name—A dam name of up to 30 positions may be reported. Do not report the name of a VIP recorded dam as this will be printed automatically.
 16. Dam No.—An acceptable dam number such as a VIP, registration, or uniform state-coded eartag number must be reported.
 19. Maternal Grandsire No.—Not required but should be reported if known. It is not necessary to report the MGS if the dam has a VIP number.
- 20 thru 24. The breeding date must be reported on the dam for all animals under 2 years of age. If the dam calved earlier or later than normal place an "X" in the box for "calved early" or "long term." If pasture bred the dates between which the sire had access to the dam must be reported.
- 25 thru 29. The owner's name and address should be filled in on only the first application for that owner. If a change in name, address or herdcode has been made since the last application, report the entire name and address again.
30. Owner's herdcode—Must be completed on each application.
 32. Association—The number for the DHI association to which the owner belongs must be reported here.
 33. Processing center—

1-California	4-Michigan	7-N. Carolina	12-Wisconsin
3-Iowa	5-Minnesota	9-Pennsylvania	
	6-New York	10-Utah	
 - 34, 35, 36. Twin or polled—If the animal is a twin or is naturally polled, place an "X" in the appropriate box. If animal is a triplet, place a "3" in box 34. If animal is the result of an embryo transfer, place an "E" in box 34.
 40. Supervisor Number—The certification number assigned to the supervisor on completion of training for VIP must be reported here.

Sketch or photo of color markings

The entire lower left half of the application is transferred directly to the Verified Identification Certificate and should be kept clean and free from marks other than those required. There are two different application forms for dairy cattle. VIP-2 has the left and right side outlines and is used for sketching the markings and also for solid colored animals. VIP-3 has no outlines and is for use only with photographs of the left and right sides of the animal. A detailed sketch or a sharp photo with good contrast and clearly showing the color markings must be provided for each side of the animal. Markings on the face must also be shown. Photographs must not exceed 3 $\frac{3}{8}$ " x 4" and must not cover any other part of the application.

Signatures

The herdowner or authorized representative and the DHIA supervisor must each sign the application. The owner certifies parentage while the supervisor verifies the permanent identification.

Applications should be enclosed with any barn sheet and forwarded to the dairy record processing center. The completed Verified Identification will be mailed directly to the herdowner by National DHIA.

DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III
Member Handout 16, Sample Verified Identification Application

DAIRY CATTLE IDENTIFICATION

For office use:

Application for a Verified Identification (VIP 2) 12-83
(Please use pencil or black ink)

10 - 1 - 97
 Mo. Day Year
Date of Application

4 3 W F E 4 3 1 1
 (1) Permanent Number(s) (Tattoo or Freeze Brand Only)

F (2) Sex L - 49 (3) Barn Name or No. 01 - 24 - 97 (4) Mo. Day Year
 Birth Date

Holstein (5) Breed B & W (6) Solid (7) Coat Color (8) Computer Control No.

04 - 19 - 96
 (20) Mo. Day Year
 Date dam was bred

NAME L - 49 (9) 1 0 0 1 (10) Eartag Number

Sire Name RuAnn Knight Lucky (12) Breed H Sire No. 1 5 1 5 2 0 7 (13)

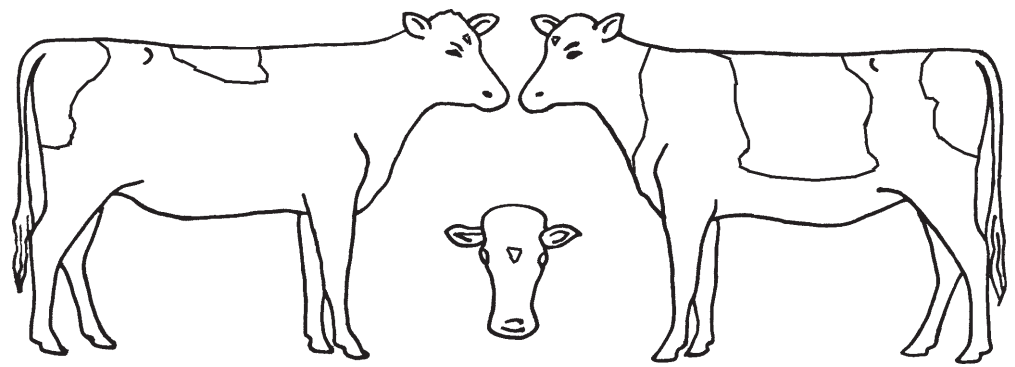
Dam Name D - 139 (14) (15) Breed H Dam No. 4 3 W D F 6 9 7 5 (16)

Maternal Grandsire Paclamar Bootmaker (18) Breed H MGS No. 1 4 5 0 2 2 8 (19)

Calved early Long term
 (21) (22)
 If pasture bred give dates the sire had access to the dam:
 From: _____ (23) Mo. Day Year
 To: _____ (24) Mo. Day Year

Don't complete the following line unless this is the first application from this herd, or a name, address or herd code change has been made.

_____ (25) Owner's Name (Print) _____ (26) Address (Print) _____ (27) City (Print) _____ (28) State _____ (29) Zip



I hereby certify the parentage and permanent identification of this animal as shown hereon to be correct and complete to the best of my knowledge.

I have personally inspected this animal and hereby verify the permanent identification as shown hereon to be correct and complete to the best of my knowledge.

_____ (30) Owner's Herdcode
 _____ (32) Association (33) Proc. Center

Twin (x), Triplet (3), Embryo Trans (E) (34) Twin with bull (35) Naturally polled (hornless) (36)

For office use:
 (37) Owner's Signature
 (38) Supervisor's Signature
 (39) Color Markings

John A. Daigman
 Owner

Ben Lester
 Supervisor

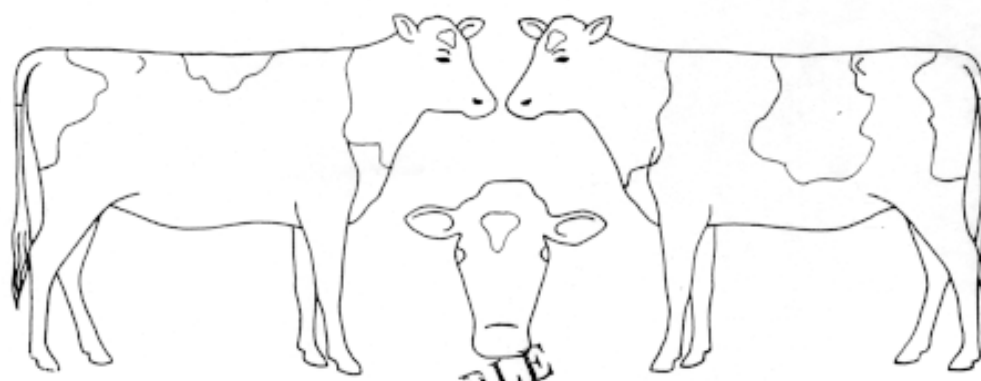

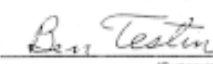


4 3 0 0 2 6
 Number

_____ (40) Supervisor's Last Name (Print)
 Final sketches and signatures must be in ink.

102-Dairy Cattle, Level III

**DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III**

Member Handout 16, Sample Verified Identification Certificate, *continued*

Verified Identification				Owner:		
National Dairy Herd Improvement Association				DAIRY VALLEY INC. R R 1, BOX 192 MIDVALE, MO 65555		
C999998	L-49			43-00-0999		
VIP Number				Herd Code		
1-24-97	HOLSTEIN	FEMALE	L-49	43WFE4311	BLACK & WHITE	
Birth Date	Breed	Sex	Control No	Barn Name or No.	Eartag or Permanent No.	Coat Color
1515207 RU ANN KNIGHT LUCKY H						
Sire Number	Name		Breed			
43WDF6975 D-139 H						
Dam Number	Name		Breed			
1450228 PACLAMAR BOOTMAKER H						
Maternal Grand sire Number			Name		Breed	
Documentation on file at: IOWA STATE UNIV. 4 KILDEE HALL AMES, IOWA 50011						
Date 1-29-76						
						
I solemnly certify the parentage and permanent identification of this animal as shown hereon to be correct and complete to the best of my knowledge.			I have personally inspected this animal and hereby verify the permanent identification as shown hereon to be correct and complete to the best of my knowledge.			
 (Registrar)			 (Supervisor)		430026 (Number)	
  Executive Secretary National Dairy Herd Improvement Association 625 Stadium Drive Columbus, Ohio 43210						

DAIRY CATTLE IDENTIFICATION

DAIRY CATTLE, LEVEL III

Member Handout 17, Sample Verified Identification Certificate, *continued*

The Verified Identification Program (VIP)

The Verified Identification Program (VIP) is a uniform nationwide procedure for identification of grade dairy cattle in herds enrolled in the National Cooperative Dairy Herd Improvement Program. A Verified Identification with a VIP number is issued to the owner of a dairy animal upon the certification of identity by that dairyman and verification of the permanent identification by the DHIA supervisor. Microfilm documentation of the application and the Verified Identification are on file. For further information on VIP, its procedures and how you may participate in the program, contact Richard Sechrist, Executive Secretary, National DHIA, 625 Stadium Drive, Columbus, Ohio 43210.

Transfer of Ownership

I hereby transfer ownership of the animal described on the reverse side of this form to:

(name) (herd code)

(address) (date)

Signed _____
(owner)

Transfer of Ownership

I hereby transfer ownership of the animal described on the reverse side of this form to:

(name) (herd code)

(address) (date)

Signed _____
(owner)

Transfer of Ownership

I hereby transfer ownership of the animal described on the reverse side of this form to:

(name) (herd code)

(address) (date)

Signed _____
(owner)

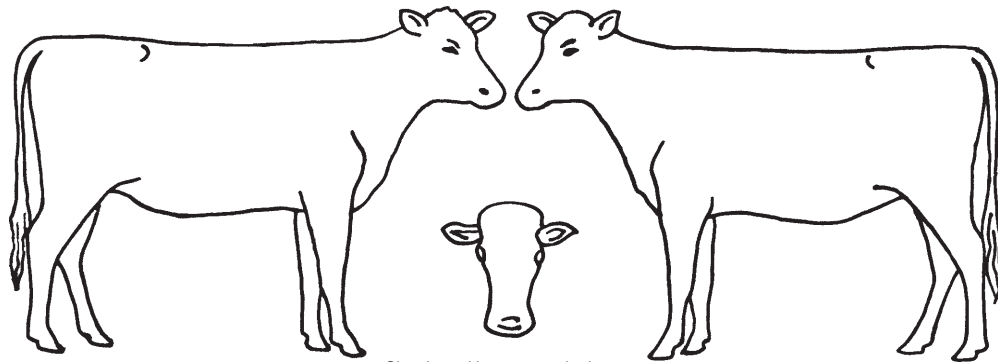
DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III

Member Handout 18, DHIA - 205 Lifetime History of Individual Cow

DHIA-205 LIFETIME HISTORY OF INDIVIDUAL COW

Start this record on the heifer calf at birth and maintain for the lifetime of the animal.

Cow Name		Reg. No.	Identification Numbers	Index No.
				Barn Name
Sire		Ear-tag	Birth Date	Tattoo No.
				Breed
Dam		Place printed identification label here	Dam's Index	

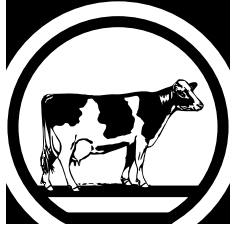


Sketch markings or attach picture

Heifer Record						(List all treatments and conditions prior to first freshening of this heifer.)					
Date	Condition	Remarks	Date	Condition	Remarks						

Type and Management Traits														(Complete this section after heifer has freshened and information is available.)									
Milking Speed	Fast	Average	Slow	Outstanding qualities:																			
Disposition	Quiet	Nervous	Ornery																				
Ketosis, Milk Fever	None	Light	Severe																				
Mastitis	None	Some	Chronic																				
Udder Edema	Light	Moderate	Severe																				
Classification	Date	FS	GA	DC	B	M	St	Hd	FE	Bk	Rp	HL	Ft	FU	RU	US	Qy	Tt	Mc	Main faults:			

Purchased from _____ Date _____ Price _____
 Date left herd _____ Reason _____
 Sold to _____ Price _____



Introduction to Production Records—DHIA

Dairy Cattle, Level III

What Members Will Learn . . .

ABOUT THE PROJECT:

- To define five uses of production record terms
- The purpose of the Dairy Herd Improvement Association (DHIA)
- How production information is collected and processed

ABOUT THEMSELVES:

- The importance of records in their own lives
- How they feel about new words
- To develop their own record keeping system

Materials Needed:

- Sample Mid-States Dairy Records Processing Center (DRPC) report
- Chalkboard and chalk or flip chart and markers

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Records are an important part of any business activity, whether it be dairying or a business in town. A simple record is a checking account with a record of deposits and checks written. Without a checking account, one would soon forget how much money had been deposited and how much had been spent. The same logic can be used in expressing the need for records on dairy cows—one would soon forget important information about the cows.

Most successful dairies have production records on their cows. A few dairies collect production information themselves, but the vast majority of dairies with a production record system are part of the Dairy Herd Improvement Association (DHIA). Dairy farmers started keeping records on their cows long before other livestock producers, probably because it was obvious there was a difference among cows in their productivity.

The DHIA system, as we know it today, began in 1936. At that time milk weights and samples were taken one day each month to evaluate each cow's production throughout the year. The program was sponsored by the United States Department of Agricultural (USDA), therefore, a standard testing procedure was established across the United States.

Leader Notes

Lifetime individual records are discussed in previous lesson. This lesson is intended to teach members about the procedures for collecting and processing production information.

Discuss the need for production records, and how production information is collected and processed. Actual records are discussed and analyzed in Level III.

Leader Notes

Begin a list of data collected on a flip chart or chalkboard.

Add this data to the previous list.

Let members examine and discuss a sample DRPC report.

ACTIVITY

The basic purpose of the production testing program (DHIA) is to evaluate individual cow's production. However, since production information is being collected on each cow, it is a convenient time to collect other management information, such as, calving, breeding, and dry dates; feeding information, including amounts and costs; and identification of offspring and service sires. From this information a lot of feeding, breeding, and management information can be generated. Included in the information are: feeding recommendations, income over feed cost values, projected dates to breed, turn dry, and freshen.

The process of collecting production information begins at the farm where a DHIA supervisor comes once each month to weigh and sample the production of each cow. The DHIA Supervisor is an employee of the local DHIA.

The supervisor is equipped with metering devices for weighing and sampling each cow's milk production. Depending on the plan of the test, the supervisor will collect the production information for one or two milkings. If one milk weight is taken, the milk weights are adjusted to represent the production for a 24-hour period. Either plan is a means of evaluating the amount of production for a 24-hour period.

The supervisor also collects the other data needed to make the production records complete. These data include: freshening dates, breeding dates, dry dates, and identification of offspring and service sires.

All of the above information is entered into a computer by the DHIA supervisor at the completion of the test. At this time the supervisor can print reports from the computer for use by the dairy farmer. These reports include: (1) milk weights, (2) feeding recommendations, (3) a list of cows and heifers to breed, (4) a list of cows and heifers to pregnancy check and (5) a list of cows and heifers to freshen.

The milk sample and the computer diskette containing the data are sent to the Kansas DHIA Lab for testing. At the lab the samples are tested for butterfat, protein, and Somatic Cell Count (SCC). All of the lab test results and production data are transmitted by computer and telephone to the main frame computer at the Mid-States Dairy Records Processing Center (DRPC).

At the DRPC all of the test day production information is computerized to make the production record complete for each cow in the herd. In addition, the herd's production information for the last 365 days is summarized. The reports generated at the DRPC are returned to the dairy farmer within 5 to 7 days after the completion of the test.

The individual cow records are transmitted from the DRPC to the USDA for sire and cow evaluation. Since the identification of each cow's sire and dam is in the record system, the USDA can use the production

ACTIVITY

Leader Notes

records to evaluate the genetic merits of the cow and her sire. The USDA calculates the Predicted Transmitting Ability (PTA) for cows and sires. This system then is an important step before selecting artificial insemination (AI) sires to be used back on the farm.

So, the DHIA program not only provides individual cow records, but it also provides information to the dairy farmer for feeding and managing the dairy herd, and it provides genetic evaluations of cows and sires for selecting future generations.

Have members design a review sheet with two columns: data and use. Place this sheet in their record book.

DIALOGUE FOR CRITICAL THINKING:

Share:

1. What new term was of most interest to you? Why?
2. How did you feel about learning new terms? Were they a help or bothersome? Why?
3. What term was hardest to understand? Why?

Process:

4. What is the most important thing the DHIA does?
5. How do you think the DHIA can help you?
6. Can you think of any problems in keeping track of all these records?

Generalize:

7. There is a lot of information that needs to be recorded about a dairy cow. Some of the same information has been recorded about your life, such as: parents, date of birth, identification number or social security number, health records, etc. Why is this information important to you and your family?
8. What other records do you have and use? Why?

Apply:

9. What are the advantages and disadvantages of using computers for record keeping?
10. What is something that you need to keep records for in the future? Why?

GOING FURTHER:

- Visit with a dairy farmer who is a member of a DHIA. Ask them about the importance of their DHIA records.
- Observe a DHIA supervisor weigh and sample milk.

Leader Notes

ACTIVITY

REFERENCES:

Author:

James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

Reviewed by:

Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University

James P. Adams, Extension Specialist, 4-H and Youth Program, Kansas State University

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