Introduction
Introduction

KANSAS 4-H
Dairy Cattle
LEADER NOTEBOOK
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2–Dairy Cattle, Introduction
This notebook is designed to help you as a 4-H dairy leader do the best job that you can to make the dairy cattle project a fun, interesting, and valuable experience for the 4-H youth that you teach. The dairy cattle project is one of several projects within the Animal Sciences 4-H Curriculum Division. It is important to Kansas, because milk and dairy products are essential to everyone’s diet. It is important to 4-H, because Kansas youth need to know how the milk they drink is produced. The dairy cattle project, then, becomes the vehicle through which we can teach profitable dairy production practices and necessary life skills to the youth who enroll. Other 4-H project areas such as veterinary science, marketing, computer, and health and safety are incorporated where appropriate.

OBJECTIVES

The objectives of the dairy cattle project are as follows:

1. Learn and apply recommended principles of dairy science.
2. Learn to use accepted practices for mental, physical and emotional health, and to respect yourself and others.
3. Demonstrate a knowledge of sound breeding, feeding and management practices.
4. Develop skills, knowledge and attitudes for lifelong use.
5. Identify breeds of animals and employ efficient marketing methods.
6. Practice leadership skills and roles, take part in community affairs, and demonstrate citizenship responsibility.
7. Develop integrity, sportsmanship, decision-making capability, and public speaking skills through participation in demonstrations, tours, judging, and/or exhibits.
8. Learn the value of scientific research and its influence upon the dairy industry.
9. Explore career, job and productive leisure opportunities.

MAJOR CONCEPTS

To help meet the above objectives, 15 general 4-H dairy cattle project concepts or topics were identified by the Dairy Cattle Design Team. Each of the specific lesson plans falls under one of these major 15 concepts—Economics, Facilities, Feedstuffs, Anatomy and Physiology, Health, Management, Nutrition, Records, Reproduction, Breeding, Exhibiting, Marketing, Milk Production, Dairy Industry, or Miscellaneous.
LIFE SKILLS

Kansas 4-H life skills have been articulated to help define the youth development outcomes of our 4-H program. It is the goal of 4-H to develop youth who are contributing, productive members of society. Youth may achieve this goal when these five life skills are developed and applied.

1. Positive self-concept
2. Sound decision-making
3. Positive interpersonal relationships
4. Desire for lifelong learning
5. Concern for community

These five life skills are incorporated throughout the lesson plans and in the educational design of the project meetings. The “Dialogue for Critical Thinking” Section leads the group through the experiential learning process.

AGES AND STAGES

Leaders can best achieve these desired outcomes with their members when they have well-prepared leader material and understand how to structure a stimulating learning environment for the age of youth they are leading. We know and believe that each child is unique, yet we also know that there are generalities about certain age groups that help us program more effectively.

These lesson plans have been developed to target four general age groups:

- Level I—ages 7 and 8
- Level II—ages 9, 10, 11
- Level III—ages 12, 13, 14
- Level IV—ages 15 and older

A review about the physical, mental, social and emotional characteristics of these age groups will prepare the leader for a successful project experience. It should be understood by the leader that the levels are also based on corresponding skill levels of youth. Thus, a 12-year-old youth enrolling in the project for the first time should probably begin with lessons in Level I, and not take Level III until the member has mastered some basic knowledge and skills.

Ages 7 and 8

Physical growth can be described as slow and steady. Mastering physical skills is important to self-concept. This includes everything from printing with a pencil to large muscle skills like catching a ball. Activities need to be just that—active! Provide opportunities to practice skills, but use projects that can be completed successfully and quickly by beginners.
Typical second or third graders think in concrete terms. If they have never seen it, heard it, felt it, tasted it, or smelled it, they have a hard time thinking of it. Leaders should show and tell, rather than giving instructions verbally. Early elementary children are learning to sort things into categories. This makes collecting things important and fun at this age. Most are more interested in the “process”—what? why? how?—than in the resulting product.

As children move away from dependence on parents at this age, they need to transfer that dependence to another adult, so the leader may become very important in their eyes. Building friendships occurs easily and generally by the end of this period, boys prefer playing with boys and girls with girls. Peer opinion now becomes very important. Small group activities are effective, but children still need an adult to share approval.

Seven and 8-year-olds need and seek the approval of adults, because they are not yet confident enough to set their own standards. Play or making believe is one way they increase their ability to imagine what other people think and feel. Rules and rituals are important, but it is very hard for children this age to lose. This is why success needs to be emphasized, even if it is small. Failures should be minimized. Cooperative games and activities are especially enjoyable. When an activity fails, the leader should help children interpret the reasons behind the failures, which teaches that failing is not always bad. Learning to cope with problems is a skill the 4-H leader can encourage for all members. The usual practice of awarding competitive ribbons should be minimized or avoided for this age. For this reason, the bucket calf exhibit should not become a “mini-heifer show.”

Ages 9, 10, 11

Physically, most children at this age are in a holding pattern, although puberty may be starting for some very early-maturing girls. Activities should encourage physical involvement, because 9- to 11-year-olds are anything but still and quiet.

Hands-on involvement with objects is helpful. Children this age like field trips, but only if they are not expected to stay confined or to do one thing for a long period of time. Upper elementary children need opportunities to share their thoughts and reactions with others. They are still fairly concrete thinkers and will give more attention if they are seeing and doing things.

Children at this stage are beginning to think logically and symbolically and are beginning to understand abstract ideas. As they consider ideas, they think it is either right or wrong, great or disgusting, fun or boring. There is very little middle ground.
The role of the leader is most crucial at this stage, as these children look to the adult for approval and follow rules primarily out of respect for the adult. Individual evaluation by adults is preferable to group competition where only one can be the best. They want to know how much they have improved and what they should do to be better next time. Encouragement from an adult can have remarkable accomplishments.

This is the age of the “joiners.” They like to be in organized groups of others similar to themselves. If you have both boys and girls of this age in your project groups, you will do best if small group work is done in same-sex groups. They generally are concerned with immediate self-reward; however, the satisfaction of completing a project comes from pleasing the leader or parent rather than from the value of the activity itself.

Toward the end of this age range, children are ready to take responsibility for their own actions. Giving these youth opportunities to make decisions should be encouraged. Leaders should move from dictating directions to giving reassurance and support for members’ decisions.

Nine, 10- and 11-year-olds have a strong need to feel accepted and worthwhile. School and other pressures become demanding. Successes should continue to be emphasized. Comparison with the success of others is difficult for these children. It erodes self-confidence. Instead of comparing children with each other, build positive self-concepts by comparing present to past performance for the individual.

**Ages 12, 13 and 14**

This is a time of developmental variety among peers. Growth spurts beginning with adolescence occur at a wide range of ages, with girls maturing before boys. These rapid changes in physical appearance may make teens uncomfortable. Slower developing teens may also be uneasy about the lack of changes.

Young teens move from concrete to more abstract thinking. Playing with ideas is as much fun as playing sports. Ready-made solutions from adults often are rejected in favor of finding their own solutions. Leaders who provide supervision without interference will have a great influence on these youth.

Small groups provide the best opportunity for young teens to test ideas. Justice and equality become important issues. Judging of projects is now viewed in terms of what is fair, as well as a reflection of the self-worth of the individual.

These youth enjoy participating in activities away from home as they begin to develop independence. Opinions of peers become more important than opinions of parents or other adults. Close friendships begin to develop, and group experiences provide opportunity for social acceptance.
As puberty approaches, emotions begin a roller coaster ride. Young teens begin to test values and seek adults who are accepting and willing to talk about values and morals. This period seems to present the biggest challenge to a young person’s self-concept. These youngsters face so many changes that they hardly know who they are. Adults can help by providing self-knowledge and self-discovery activities such as the “dialogue for critical thinking” portion of these lesson plans.

Continue to avoid comparing young people with each other, being careful not to embarrass them. They want to be a part of something important that provides opportunity to develop responsibility.

**Ages 15, 16 and 17**

Most teens of this age know their own abilities and talents. In most cases, they have adjusted to the many body changes by now. Many develop athletic talent and devote hours to training and competition. Learning to drive a car further moves the teen from family into the community as independent people.

Mid-teens begin to think about their future and make realistic plans. Their vocational goals influence the activities they select. Teens set goals based on feelings of personal need and priorities. Any goals set by others are generally rejected. As they master abstract thinking, they can imagine new things in ways that sometimes challenge adults.

These teens can initiate and carry out their own tasks without supervision. A leader can be helpful by arranging new experiences in areas of interest to teens, but must be sure to allow for plenty of input from them. Leader-member relations should change from director/follower to that of advisor/independent worker.

Mid-teens tend to be wrapped up in themselves. Relationship skills are usually well-developed. Dating increases and acceptance by members of the opposite sex is now of high importance. Sports and clubs are important, but these teens now want to be recognized as unique individuals within that group.

Two important emotional goals of the middle-teen years are independence and identity. Time is precious. If activities are perceived as busywork, teens soon will lose patience and interest. Middle teens are learning to cooperate with others on an adult level. They will pride themselves on increased ability to be responsible in the eyes of themselves, peers and adults.
Ages 18 and 19

These young adults are completing their 4-H careers and moving on to college, jobs, marriage, and other adult responsibilities. If continuing involvement at the local level, they will be self-directed learners or assume adult leadership roles.

This information on child development has been taken from the North Central Regional Extension Publication No. 292, *Ages and Stages of Child and Youth Development: A Guide for 4-H Leaders*, written by Jeanne Karns, graduate assistant and Judith Myers-Walls, Extension Specialist, Human Development, Purdue University.

YOUTH DEVELOPMENT

Some child development specialists and educators have noted every child of the ‘90s is at “some risk” because of the complex social forces affecting our country since the early 1950s. In 1991, The National Commission on Children estimated that fully one-quarter of all children are “at severe risk” in relation to substance abuse, school failure, delinquency, etc., and another quarter are “moderately at risk.” H. Stephen Glenn and Jane Nelsen document these changes in their book, *Raising Self-Reliant Children in a Self-Indulgent World*. Four major factors necessary for the development of capable young people have been identified that are generally missing from our culture—networks, meaningful roles, on-the-job training, and parenting resources. 4-H project meetings can help restore these vital missing pieces.

Glenn’s definition of a network, in the simplest sense, defines the 4-H project meeting: “two or more individuals who engage in dialogue about the world and the life they are living and who occasionally collaborate to achieve some mutually desirable end.” The dialog for critical thinking portion of these lesson plans directly address this definition.

Many youth today are growing up in families and communities without any significant role to play. They just don’t seem needed until they become an adult. Research indicates that a primary cause of decline in motivation, discipline, and achievement is this perceived lack of need or value. Glenn and Nelsen challenge us to deal with youth actively in ways that affirm their contributions. **We must treat youth as contributors and assets rather than passive objects to be done for or to.** As 4-H project leaders, when we listen to members, we must take them seriously and treat them as significant, we will begin to restore the dialogue and collaboration necessary to link youth with the larger society.

On-the-job training with “hands-on” involvement has been the cornerstone of 4-H project work. It is important for youth to have this opportunity because that is where they learn patience, personal initiative, hard work, and deferred gratification. If they don’t learn about real life in this way, they receive its impressions passively from the media, generally through five hours of television each day.

8–Dairy Cattle, Introduction
“Learning by doing” is one of the primary reasons why 4-H has been recognized in the field of informal education. If we, as parents or leaders, think we are helping when we do their work for them, we need to stop and consider that, “The best way to destroy self-esteem and a sense of worth in young people is to do too much for them. This robs them of a sense of personal capability. The greatest gift of all is to help them validate themselves as agents in their own lives.” (Glenn and Nelsen, pg. 47)

Today’s parents need all the help they can get. According to the Ewing Marion Kauffman Foundation report, *Reweaving the Tattered Web—Socializing and Enculturating our Children*, by Basil J. Whiting in June 1993, “Three generations and extended families in the same house are not so common. Grandparents and aunts and uncles live longer distances away, and often alone (only five percent of American children now see a grandparent regularly)…. Divorce is common. Half of those who remarry will experience a second divorce. Half of all children will spend some of their childhood with a divorced parent.” As a 4-H project leader, you become a parent resource, both to the child and the child’s parent.

Today’s parents are concerned and fearful for their children. Why? Dr. Bruce Baldwin, nationally known psychologist and author says, “They wonder if their kids have what it takes to succeed as they have. Parents know that in the future, even menial positions will require well-developed cognitive skills: reading, writing, math, computer literacy, and the ability to process information quickly and efficiently.” (*TEAM, The Early Adolescence Magazine*, Vol. IV, No. 5, May-June 1990)

The same magazine noted that a large metropolitan education trust reported the types of requirements for employees comparing the past with the future:

<table>
<thead>
<tr>
<th>PAST</th>
<th>FUTURE</th>
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<tr>
<td>Doers</td>
<td>Thinkers</td>
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<tr>
<td>Single repetitive functions</td>
<td>Quality circle approach</td>
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<tr>
<td>Individual piecework</td>
<td>Team centered</td>
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<tr>
<td>Autocratic</td>
<td>Participatory</td>
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<td>Single job in lifetime</td>
<td>Flexible learners</td>
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<td>Familiar with simple machines</td>
<td>Technology knowledgeable</td>
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<td>Single task orientation</td>
<td>Information processors</td>
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The January 1990 issue of *Prevention Forum* magazine offers hope for today’s youth when it reports that research on youth who have become healthy adults in spite of adversity have had the opportunity, somewhere in their lives, to experience a caring, nurturing environment that encourages
their active participation in problem-solving, decision-making, planning, goal-setting, and helping others in meaningful activities.

According to the Kauffman Foundation report, “child and youth development by natural osmosis is no longer an effective strategy. We can rely no longer on child development to occur as a natural by-product of family and community functioning because too many families and communitites no longer function the way they used to.

This means reweaving the web to do what the family and community no longer do, and perhaps no longer can do adequately. It means constructing new institutions and new ways for children and youth to sustain relationships with a variety of caring adults…. Yet this must be supplementation, not replacement. We dare not leave out strands of parent-strengthening services in the many ways and places where traditional parenting is, at bottom, the still-to-be-preferred approach.”

The project lesson plans contained in this leader’s notebook have been designed to incorporate the components critical to the development of capable, contributing young people. By following these plans, leaders will help prepare their members to function and live productively in the world which they will soon inherit and direct. They are also designed to help you, as the leader, quickly and easily prepare for the lesson, conduct the activity, and facilitate the discussion and dialogue.
EXPERIENTIAL LEARNING MODEL

1. Experience
   the activity; perform,

2. Share
   the results, reactions, observations

3. Process
   discuss, look at the experience; analyze,

4. Generalize
   to connect the experience to real-world

5. Apply
   what was learned to a similar or different situation;

Do
Reflect

Example questions used to complete the Experiential Learning Model

A. Share (what happened)
   1. What did you do?
   2. What happened? What did you see? Hear? Touch? Taste?
   3. How did you feel?
   4. How did it feel to…?
   5. What was most difficult? Easiest?

B. Process (what’s important)
   1. What problems or issues seemed to occur over and over?
   2. What similar experiences have you had?
   3. What was most important?
   4. Why was that significant?
   5. Why do you think it happened?
   6. What caused you to feel that way?

C. Generalize (so what?)
   1. What did you learn about yourself through this activity?
   2. What did you learn about a life skill?
   3. How do the major themes or ideas relate to real life and not just the activity?
   4. How did you go about making your decision?

D. Apply (now what)
   1. How can you apply what you learned (life skill) to a new situation?
   2. How will the issues raised by this activity be useful in the future?
   3. How will you act differently in the future as a result of this activity?
   4. How can you do it differently for different results?
APPLYING THE EXPERIENTIAL LEARNING PROCESS

Hands-on involvement (learning by doing) is the most effective method for learning this material. It helps youth learn personal initiative, hard work, patience and deferred gratification. By doing the work for the youth, parents, teachers and leaders may destroy the young person’s self-esteem and sense of worth. They may rob youth of learning by trial and error, practicing skills and becoming competent and capable. The greatest gift leaders can give is to help youth validate themselves as capable people. These lessons were designed using a model known as the **experiential learning process** which was adopted as the national curriculum development model for Extension Youth Development in 1992.

Experiential learning takes place when a person is involved in an activity, looks back and evaluates it, determines what was useful or important to remember, and uses this information to perform another activity.

The Experiential Learning process encourages youth involvement through dialogue and strengthens adult-child relationships. To enhance the goal of learning an atmosphere of friendliness, trust, and unconditional acceptance is required.

In each lesson, the “Dialogue for Critical Thinking” questions help complete the experiential learning steps. Except for the content review questions, most of these leading questions do not have a “right” or “wrong” answer. In addition to providing feedback to the leader, their purpose is to affirm and validate the perceptions of the members.

Take time to begin to feel comfortable with this process. It may seem awkward at first, but remember, Latin for “to teach” means to draw forth through dialogue and understanding. When the Experiential Learning process is used to help youth share the process of discovery, leaders will be developing them as critical thinkers, concerned for others, with the wisdom to function successfully in their future world.

FORMAT OF EACH LESSON PLAN

Each lesson plan in this notebook follows the same general outline which includes:

**TITLE**—generally descriptive of the skill to be learned.

**LEVEL**—describes which age level it is written for.
What Members Will Learn . . .

ABOUT THE PROJECT—indicates what subject matter will be learned.

ABOUT THEMSELVES—indicates what personal or life skills will be learned. These specific objectives can be used to evaluate if the lesson was successful and learning goals accomplished by the members.

MATERIALS NEEDED—tells the leader what equipment, supplies, visuals or handouts will be needed in preparation for the lesson.

ACTIVITY TIME NEEDED—gives the approximate time needed to complete the activity. Most lessons can be completed in 30 to 60 minutes.

ACTIVITY—information is what the leader needs to know to teach the activity. This portion can be used as a leader’s script for the leader if necessary.

LEADER NOTES—give directions or instructions for the leader which go with the “Activity” information. Space is available for leaders to write their own notes also. Member activity sheets or handouts are provided for the leader to copy and give to members to work on at the meeting or take home so parents can reinforce the learning.

DIALOGUE FOR CRITICAL THINKING—questions are provided for the leader to help enhance life skill development and generalize the subject information to the real world of the youth participant.

GOING FURTHER—ideas such as tours, demonstrations, handouts, and things to do at home, are for the leader and members to consider if they want to learn more about this particular lesson content.

REFERENCES—credit the source used to develop this lesson activity in addition to the author.

AUTHOR—is the source of information plus names of Kansas State University faculty who reviewed and adapted this lesson including specific ideas from volunteers.

The dairy project is one of several Kansas 4-H projects to undergo a major change in the way the project materials have been designed and used. Leaders need to realize that members will no longer receive member resource books or materials through the County Extension Office. Members will receive a “Member Guide and Annual Report” which outlines how to set learning goals, describes learning opportunities, describes
the recognition system, suggests where they can find more information, and provides a year-end dairy summary record. All other printed materials for members will be given to them by their project leader.

In order for members to have a successful project experience, it is imperative that a leader meet with members. These lessons work best with an adult and/or teen leader working with a small group of members. Several youth in the group will stimulate the discussion and dialogue, which is so important to the success of this process. If members are unable to meet in a group, the parent may serve as a leader to his/her child by requesting copies of the appropriate lesson plans from the K-State Research and Extension office and completing them at home.

The project has been restructured to feature a series of sequential learning experiences based on members’ age and skill level, which will challenge them with new skills each year they remain in the project. Our goal is to make them knowledgeable of the entire industry rather than specialize in one type of project exhibit. In fact, owning an animal and exhibiting at a show need not be required. It is possible for a member to participate in the group lessons without owning an animal. Owning, caring for, and exhibiting an animal should be considered a special bonus to the total project experience.

The project exhibit should be decided by the member, parent and leader, based on member’s age, skill level, facility and financial needs, and what local exhibit opportunities have been identified. Most counties provide county fair classes for bucket calf, breeding heifers and cows. This approach to the materials provides maximum flexibility for counties to establish exhibits that meet the needs of their members. Statewide opportunities offer breeding heifer and cow classes, plus judging and quiz bowl opportunities.

Ideally, members should progress through all levels in order, but it is not necessary. If project members vary in age and skill levels and the group is large enough, splitting into like age groups with additional leaders is recommended. Older members might be used as assistant leaders with beginning levels which then allows teens to be self-directed learners for advanced skills, or teens might meet together as a multi-club or county-wide group.
ROLE OF THE 4-H PROJECT LEADER

Your major roles are that of teacher, facilitator and encourager.

Your Role as Teacher:
- Help members set goals.
- Share your knowledge of the project through meetings, tours and home visits. Having five to 10 meetings works well. Set meeting dates and times with the participants. Remind participants of upcoming meetings.
- Invite and involve parents and other leaders when appropriate.
- Keep your skills current through trainings, consultations and reading. Ask for help or advice as needed.

Your Role as Facilitator:
- Use techniques to facilitate (assist) learning. See “Teaching with Discussion.”
- Be sensitive and respond to individuals’ needs, beliefs and family circumstances. Do not judge.
- Help members find additional learning opportunities and resources. (Using “Going Further” in the lessons.)
- Relate project to everyday life and career possibilities.

Your Role as Encourager:
- Recognize the personal growth of members and help them celebrate their successes.
- Lead (not push) participants into new skills and new ways of thinking. Encourage and challenge them to become better persons, yet always accept them and love them as they are now.

Your classroom is wherever the member must be in order to learn—in the home, meeting room, or on a field trip. Your subject matter, what you teach, is dairy science and youth development.
TEACHING WITH DISCUSSION

Why Use Discussion?

Discussion is part of every lesson. Discussion questions appear in the “Dialogue for Critical Thinking” section. Discussion is most effective when you want to:

1. Give participants practice thinking in terms of the subject matter.
2. Help participants evaluate their beliefs.
3. Stimulate participants to apply principles.
4. Help participants learn to anticipate or solve problems.
5. Use the resources of the group members.
7. Develop motivation for further learning.
8. Get feedback on how well participants learned the material.

How Can I Get People to Talk?

Discussion can be difficult at first simply because few participate. Sometimes, all that is necessary to improve the situation is time, your smiles and encouragement, and practice. Many participants are used to being talked at, not with in educational situations. The fear of being embarrassed is another major factor. Not knowing the other participants, being unsure of one’s idea, being afraid of sounding silly—these make participants feel that the safest thing to do is remain silent.

How Can I Help Them Overcome Their Fear?

The first step is making sure participants become acquainted with each other and with you. Begin by having get-acquainted activities at the organizational meeting. Continue by providing games, refreshments, time to talk, and other opportunities for friendship building throughout the project meeting period. Get to know each participant personally. Take a special interest in them; they will come to trust you.

When asking a question, call on participants by name. This seems to promote freer communication.

Sitting in a circle also encourages exchange.

Eliminate the fear of being wrong. (This is a tremendous barrier to discussion.) Avoid questions where there is only one right answer. Do not judge participants’ answers about beliefs and preferences. Do not allow any participant to make unkind comments about another’s answer.

At times, give participants opportunities to talk in small groups to work out answers together. If your group seems to have difficulty responding to questions, allow them to write out their answers first. This seems to give them added confidence to share their thoughts with
others. As much as possible, ask questions that can have no wrong answers: How do you feel about this? What do you think?

**What if Someone Talks Too Much?**

There are several effective ways to work with a person who monopolizes the discussion. You might ask this person and at least one other to observe the discussion and report their observations to the group; for example: Did we solve the problem? Did everyone get a chance to participate? Another option is to divide into smaller discussion groups. Ask one person from each group to report the results of the discussion. Do not choose the monopolizer to report. You also could talk to this person privately. Explain that you appreciate the participation and insights, but you believe other people also should be given the opportunity to learn how to talk in a group. Ask this participant to help the group by allowing others more time for discussion and perhaps saving personal insights for more difficult questions.


**THE FIRST MEETING**

The first meeting is usually an organizational one to plan for the project year. It is a good idea to have parents attend this first meeting with the members. Parents should be encouraged to take part in any or all activities.

As members arrive, plan something for them to do. Perhaps a teen leader can be prepared with a get-acquainted game or activity. Make sure every member knows everyone else. Do not assume this is the case. Taking time now to build group trust will have payoffs later in commitment, discipline and encouraging discussion. Share some of the broad objectives you have for the project. Set dates with members and parents for future meetings. Schedule any demonstrations with members and discuss other special activities for the entire year. Discuss your expectations for recovering costs of materials, copying, etc.

Young people deserve to be treated as contributors and assets instead of passive objects to be done for or to. Your job is to involve your participants and challenge them toward learning and personal growth. They should be involved in the planning and preparation of meetings. A map helps to give us direction, keep us on track and know when we’ve reached our destination. We’ve designed a MAP—Member Achievement Plan—to help you and your members plan, as a group and as individuals, what they want to learn, make and do in this project. This is called goal-setting. It also teaches decision making.
MAP STEP 1
At the project meeting, or at home with their family, members identify two things they would like to learn in their dairy project this year.

MAP STEP 2
List three to five steps that will help you complete your first goal.

MAP STEP 3
List a date or deadline that shows when you plan to complete each step toward your goal.

MAP STEP 4
As you complete a step or meet a deadline, give yourself a boost, energizer or reinforcer for your success.

MAP STEP 5
List one energizer for each step accomplished toward a goal. After finishing a step, record the “date completed.”

MAP STEP 6
Repeat Map Steps 2 through 5 for your second goal.

MAP STEP 7
Share with a project friend what you have planned. Talking helps generate new ideas to improve your plans. After explaining your goals ask your friend to sign your plan as well as your leader. This will help confirm your plans and be a source for assistance.

MAP STEP 8
Take notes in the journal to help remember your project experiences. Tell what you did, what you learned, and how you felt about each project activity (meeting, trip, demo, etc.). Note: Leader may want to keep journals and plan for each member to make an entry as part of each activity.

MAP STEP 9
At the end of the year take time to reflect with your project friend and leader. Record your thoughts and ideas. How did the goals work? What was learned? What needs to be accomplished next? Members may not have accomplished what they set out to do, but they may have learned many things in the process. Setting a goal to reach a partial number of total goals isn’t a bad idea, since it enables the younger member to feel successful.

The member and the leader, or in the case of the parent leader, the member and the parent, should complete Step 7 of the MAP as soon as the member has completed his/her short-term plans. All members who complete this step should be given immediate recognition.
for their project goal-planning accomplishments. Kansas 4-H has created a new recognition system for recognizing 4-H members for reaching annual project goals. Check with your county agent to see if this special recognition is offered in your county.

When properly used, incentives can be an effective way to encourage good project work and enhance personal development of the members. One of the strongest human incentives is that inner feeling of accomplishment and achievement.

Public recognition in news articles or at meetings, a word of encouragement or pat on the back from leaders are also effective in promoting desirable performance.

Group recognition should be used at the end of the project to recognize the accomplishments of each member who completed the project, attended a certain number of meetings, demonstrated certain acquired skills, etc. Recognize not only the member who might have won the championship, but use your imagination to recognize the most helpful member, the most reliable, the most prompt, the most improved judge, etc.

REFERENCES

Portions of this introduction section have been adapted from the Beef Cattle Leader Guide published by the Texas Agricultural Extension Service, and from Celebration!, Nebraska Cooperative Extension Service, 4-H publication 262.

Reweaving the Tattered Web—Socializing and Enculturating our Children, by Basil J. Whiting, is published by Ewing Marion Kauffman Foundation, 4900 Oak, Kansas City, MO 64112-2776.

Raising Self-Reliant Children in a Self-Indulgent World, by H. Stephen Glenn and Jane Nelsen, Ed. D., is published by Prima Publishing and Communications, P.O. Box 1260SR, Rocklin, CA 95677, (916) 624-5718, and can be ordered from St. Martin’s Press, 175 Fifth Avenue, New York, NY 10010 (212) 674-5151.

A video presentation by H. Stephen Glenn, which summarizes much of Raising Self-Reliant Children in a Self-Indulgent World, can be requested through your county K-State Research and Extension office. Ask for the video, Developing Capable Young People, available from Kansas State University, Department of Communications.
PLANNING HELPS

The following forms may be used by the leader to help in planning for their dairy project experience.

- Project Member Enrollment Record
- Project Leader Meeting Record
- List of Members and Their Goals
- Volunteer Support Form
- Project Meeting Checklist
## PROJECT MEMBER ENROLLMENT RECORD

<table>
<thead>
<tr>
<th>Name</th>
<th>Age Jan. 1</th>
<th>Yrs. in Project</th>
<th>Parents’ Name(s)</th>
<th>Address</th>
<th>Phone No.</th>
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21–Dairy Cattle, Introduction
<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Phase(s)</th>
<th>Project Leader</th>
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<tr>
<th>Project Members</th>
<th>Attendance at Project Meetings</th>
<th>Presentations Made by Members</th>
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<tr>
<td>Name</td>
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22–Dairy Cattle, Introduction
# LIST OF MEMBERS AND THEIR GOALS

1. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

2. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

3. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

4. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

5. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

6. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:

7. **Name**
   - Plans or wants to do:
   - Assistance, resources, or materials needed:
VOLUNTEER SUPPORT FORM

Volunteer I name ____________________________________________________________________________

Volunteer II name ____________________________________________________________________________

Address ____________________________________________________________________________________

City ____________________________ Home phone _______________________

Volunteer I Occupation ____________________________ Business phone _______________________

Volunteer II Occupation ____________________________ Business phone _______________________

Other Volunteer obligations ____________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

I would be willing to assist the 4–H program by:

<table>
<thead>
<tr>
<th>Volunteer I</th>
<th>Volunteer II</th>
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24–Dairy Cattle, Introduction
**PROJECT MEETING CHECKLIST**

*A Meeting Evaluation Instrument*

After your project meeting, take a few minutes to consider each of the following questions. This checklist should also serve as a reminder of ideas to incorporate in future project meetings.

<table>
<thead>
<tr>
<th>Meetings Held</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
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<tbody>
<tr>
<td>1. Were the objectives of the meeting clear to members?</td>
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<td>2. Did I give each member a chance to actively participate? (sharing ideas, assisting, presentations)</td>
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<td>3. Did I commend or encourage each youth in some way?</td>
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<td>4. Did I plan for differences in ages, abilities and interests of members?</td>
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<td>5. Did I observe progress of individual members?</td>
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<td>6. Did I involve other volunteers in some way? (planning, leadership assistance, transportation, refreshments)</td>
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<td>7. Did I give members a chance to assume responsibility when it was appropriate?</td>
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<td>8. Did I incorporate some fun activity or game into the project meeting?</td>
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<td>9. Did I summarize the new information shared and skills learned at the close of the meeting?</td>
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<td>10. Most of all, did I enjoy working with the young people involved?</td>
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*Seven or more positive responses denotes an excellent meeting rating!*
Welcome to the 4-H Dairy Cattle Project! The purpose of this Member Guide and Annual Report is to help you journey through your Dairy Cattle Project. This guide will:

- Identify how to set goals on things to learn and begin your dairy cattle project,
- Identify 4-H learning opportunities,
- Identify 4-H recognition system,
- Provide you with an annual summary for your Kansas 4-H Dairy Cattle Project.

**EXAMPLES OF GOALS ON THINGS TO LEARN**

- **Level I** - Identify 10 parts of a calf
  - How to wash your calf
- **Level II** - How to show a dairy heifer
  - How to judge dairy cattle
- **Level III** - How to give oral reasons
  - How cows give milk
- **Level IV** - Analyze production records
  - How to balance a ration

In addition, there is a note to your parents/guardian at the bottom of this page, so they can help you with your dairy cattle project.

**LEARNING OPPORTUNITIES IN 4-H**

- Attending project meetings with your friends
- Learning record-keeping skills
- Giving presentations at club and county 4-H Days, State Fair, school or civic groups
- Attending judging clinics and contests to observe, evaluate and make decisions
- Exhibiting at local, county, state or national shows

**4-H RECOGNITION SYSTEM**

4-H’s Recognition System is diverse and provides you with many learning opportunities:

- Participation: attending project meetings, helping others at project meetings, show and share at State Fair
- Progress toward goals: meeting the deadlines you set on your MAP sheet (see page 2)
- Standards of excellence: meeting a high percentage of learning goals for each level of the project
- Peer competition: judging and showmanship contests at shows and fairs
- Team/cooperative efforts: community service activities

**NOTES TO PARENTS/GUARDIANS:**

If your youth does not have a group leader, check with your local K-State Research and Extension office to see if your youth can participate in a neighboring club. If this is not available, you will need to act as the leader or helper. The K-State Research and Extension office has a copy of the “Dairy Leader’s Notebook” you may wish to use.

Insert all member handouts and activity sheets in the 4-H Record Book after this Member Guide and Annual Report. These records are a recording of what was done. List costs, hours spent, etc., on your journal page created in MAP STEP 8. Financial and performance records may be found in: Level II pages 81 to 88; Level III pages 107 to 110 and Level IV pages 25 to 31, 43 to 56, 129 to 140 and 149 to 158. Using records before the youth is capable of understanding the concept or doing the math computations is strongly discouraged!
HOW TO SET GOALS AND BEGIN YOUR DAIRY CATTLE PROJECT USING THE MEMBER ACHIEVEMENT PLAN—MAP

This is your Member Achievement Plan—MAP. This plan will help you begin to decide what goals, deadlines and energizers you want to use for the upcoming year.

MAP STEP 1
Identify as goals two things you would like to learn this year. Your leader will give you a list that might help you think about what you want to learn in your dairy project.

Goal 1: _____________________________________________________________________________

Goal 2: _____________________________________________________________________________

MAP STEP 2
After you identify each goal, let’s break them into steps. You can list 3 to 5 steps for each one of your goals.

Steps for Goal 1: Map Step 3 Map Step 4 Map Step 5
1st _________________________________________________________________________________
2nd _________________________________________________________________________________
3rd _________________________________________________________________________________
4th _________________________________________________________________________________
5th _________________________________________________________________________________

MAP STEP 3
Now that you’ve put Goal 1 into steps, go back and put a deadline next to each step. The deadline shows when you plan to complete the step. Every step should have a different deadline or date.

MAP STEP 4
Sometimes goals are hard to stick to. It takes a long time to see results. So as you complete a step and meet a deadline you need to give yourself a boost. Let’s call this boost an energizer or reinforcer. An energizer can be anything that you like and enjoy: going to a movie with a friend, talking on the phone, listening to a CD, taking your dog for a walk, eating a healthy snack, playing ball, etc.

What are other things you might use as energizers? List them here: __________________________________________

Now, place one energizer for each step under the column marked, “Energizer.”

MAP STEP 5
When you’ve finished a step in your goal, place the date completed in the column marked, “Date Completed.”
MAP STEP 6
Now that you’ve identified your steps, deadlines and energizers, do the same for Goal 2.

Steps for Goal 2: | MAP STEP 3 | MAP STEP 4 | MAP STEP 5 |
--- | --- | --- | --- |
1st | | | |
2nd | | | |
3rd | | | |
4th | | | |
5th | | | |

MAP STEP 7
Your goals, steps, deadlines and energizers are written. It’s time to share with one of your project members. When we talk to others about our goals, it helps us get a better idea of what we are going to do. Sometimes talking will help us get a better idea, so don’t worry about changing any part of your MAP if you want to. After you’ve explained your goal to a project friend, have them sign and date it in the space provided below.

Project Friend’s Signature ___________________________ Date ________________

Have your project leader sign below:

Project Leader’s Signature ___________________________ Date ________________

MAP STEP 8
Keep a journal of everything you do in the project to help you remember these experiences. (Create a page with these headings and add it to this record.)

<table>
<thead>
<tr>
<th>Date</th>
<th>What you did, learned, how you felt, costs, time spent, etc.</th>
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<tbody>
<tr>
<td>Nov 5</td>
<td>Attended a project meeting and learned parts of a dairy calf.</td>
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<tr>
<td>Dec. 6</td>
<td>Spent 10 hours building a shed for my bucket calf.</td>
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</table>

MAP STEP 9
You’ve spent a whole year on your project. You should have learned many new things. Take some time to think back and review your journal (STEP 8). Write one or two main things you have learned about dairy science. What is something you have learned about yourself while studying dairy? (Add a page if you need more space.)
KANSAS 4–H LIVESTOCK SUMMARY

(If you have more than one animal, change answers to totals or averages.)

Name of project ___________________________ Type of animal to exhibit ___________________________

Name ___________________________ Age _______________ Years in 4–H ______________

Club ___________________________ County ___________________________

Breed of animal ___________________________

Describe your animal:

Date of Birth ________________ Name ______________________ Registration Number __________________

What is your animal’s eartag number?______________

Sire’s Name _________________________ Registration Number __________________________

Dam’s Name _________________________ Registration Number __________________________

How much did it cost? ________________ When did you get it? ________________

End of year value or sale price ________________

Value of milk produced ________________

What did you feed your animal each day when it was young? ___________________________

What did you feed your animal each day as it grew bigger? ___________________________

What equipment did you need to care for your animal? ___________________________

Not required for 7- to 9-year-olds, due to math skills needed

1. How many dollars did you get when your animal was sold? $ ___________

2. How many dollars did you pay for it? $ ___________

3. Total income (subtract line 2 from line 1) $ ___________

4. Total feed cost $ ___________

5. Other expenses (veterinarian, rent, equipment) $ ___________

6. Total expenses (add line 4 and line 5) $ ___________

7. Profit or loss on project (subtract line 6 from line 3) $ ___________

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MG38 July 1998

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30–Dairy Cattle, Introduction
Kansas 4-H Dairy Cattle Leader Notebook
Level I

Color a Rainbow Calf: Identifying Parts of a Calf .................................................... 3
Beginning to Set Goals in Your Dairy Cattle Project .............................................. 11
Care of a Newborn Calf ........................................................................................... 15
Housing for Your Calf ............................................................................................. 19
Feeding a Bucket Calf ............................................................................................. 25
Is Your Calf Sick or Well? ...................................................................................... 29
Weaning Your Bucket Calf—And Other Management Practices ......................... 33
Training Your Calf to Lead ..................................................................................... 39
The Proper Way to Wash Your Calf ....................................................................... 43
Being Prepared: How to Pack a Tack Box for a Show ........................................... 49
Foster Mother of the Human Race—The Dairy Cow .............................................. 55
About the project:
- To recognize the body parts of a calf
- To identify at least seven parts of a calf
- To name, from memory, at least five parts of a calf

About themselves:
- Appreciate differences and similarities

Materials needed:
- Activity Sheet 1, Coloring a Calf
- Activity Sheet 2, Matching Calf Parts
- Leader’s Key, Activity Sheet 1, Coloring a Calf
- Leader’s Key, Activity Sheet 2, Matching Calf Parts
- Crayons or coloring pencils (most members could bring their own)
- Flat surface, table, counter, etc.
- Flip chart or chalkboard

Activity Time Needed: 30 Minutes

Activity

Knowing the parts of a calf is important when learning about the dairy cattle project. Knowing parts and correct dairy terminology will help increase your knowledge of dairy cattle. Knowing the parts of a animal are important in judging at contests, answering questions, judging your own cattle, talking to a vet about an animal’s sickness or injury or simply visiting with others in the dairy business.

Here is a picture to color. Since everyone has crayons we’ll work on this together. Color each part as I tell you the color and name of the part.

Leader Notes

Pass out Activity Sheet 1, Coloring a Calf. Use Leader’s Key to give a part and color. Note: May want to let members color one sheet on their own and then do a correction sheet and compare.

After 15 or 30 minutes, review some of the main parts.

Hand out Activity Sheet 2, Matching Calf Parts to see how well they have learned main parts.
Leader Notes

ACTIVITY

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What parts of the calf did you learn for the first time?
2. What parts of the calf are hard/easy to remember? Why?

Process:
3. How many calf parts can you name? (Point to parts one at a time.)
4. Why do you think you need to know the parts of a calf?

Generalize:
5. Have you or someone you know ever judged dairy? How important was it to know the parts of dairy cattle and the general shape of each part?
6. What shapes do some parts have?

Apply:
7. As the calf grows, do these parts or shapes change? Why or why not?
8. What parts of the calf are similar to parts of other animals? Discuss.

GOING FURTHER:
- Design your own calf drawing and label each part.
- Visit a veterinarian’s office.
ACTIVITY

REFERENCES:

Author:
Brian A. Swisher, County Extension Agent, 4-H and Youth Programs,
Kansas State University
James P. Adams, Extension Specialist, 4-H and Youth Programs,
Kansas State University

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

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

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Dairy Cattle Leader Notebook, Kansas State University, March 1999.

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COLOR A RAINBOW CALF: IDENTIFYING PARTS OF A CALF
DAIRY CATTLE, LEVEL I
Activity Sheet 1, Coloring a Calf

Color the following parts of a calf the corresponding color.

13. Tail—Blue 14. Thigh—Orange
17. Hoof—Brown 18. Knee—Blue
19. Front leg—Pink
COLOR A RAINBOW CALF: IDENTIFYING PARTS OF A CALF
DAIRY CATTLE, LEVEL I
Leader’s Key, Activity Sheet 1, Coloring a Calf

Color the following parts of a calf the corresponding color.

1. Poll—Orange
2. Ear—Pink
3. Head—Purple
4. Muzzle—Yellow
5. Eye—Gold
6. Neck—Brown
7. Brisket—Green
8. Shoulder—Pink
9. Withers—Red
10. Back—Green
11. Barrel—Blue
12. Rump—Red
13. Tail—Blue
14. Thigh—Orange
15. Hind leg—Yellow
16. Hock—Red
17. Hoof—Brown
18. Knee—Blue
19. Front leg—Pink

7–Dairy Cattle, Level 1
COLOR A RAINBOW CALF: IDENTIFYING PARTS OF A CALF
DAIRY CATTLE, LEVEL I
Activity Sheet 2, Matching Calf Parts

Draw a line from the word to the part on the calf.

Eye

Poll

Ear

Shoulder

Back

Tail

Thigh

Muzzle

Knee

Barrel

Hock

Hoof
COLOR A RAINBOW CALF: IDENTIFYING PARTS OF A CALF
DAIRY CATTLE, LEVEL I
Leader’s Key, Activity Sheet 2, Matching Calf Parts

Draw a line from the word to the part on the calf.
Beginning to Set Goals in Your Dairy Cattle Project

Dairy Cattle, Level 1

What Members Will Learn . . .

ABOUT THE PROJECT:
  • How to set project goals

ABOUT THEMSELVES:
  • The importance of setting goals

Materials Needed:
  • Chalkboard or flip chart
  • Dairy Cattle Member Guide and Annual Report (MG-38)
  • Activity Sheet 3, Learning Topics

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Each year you will set several goals to accomplish during the project year. Goals help you get where you want to go.

If this is your first year, you might want to have just one goal, to select your project calf.

List one or two goals (MAP Step 1) on page 2 for this project year.

Breaking a goal into steps (MAP Step 2) helps you better understand the action needed to make that goal a reality. Some goals have many steps, some have a few.

With each step you need to set a deadline (MAP Step 3). Deadlines are when you expect to have that step of your goal done. As you meet the deadline you set for each step, you need to use an energizer (MAP Step 4). Energizers encourage you to move toward your goals by offering a small reward for meeting your deadline.

Now complete MAP Steps 6 and 7. You have set your goals for Year 1 of your dairy project.

Leader Notes

Put participants into groups of three or four. Mix new project members with youth who have had some experience with dairy or other animal projects. Hand out Member Guide and Annual Report (MG-38) plus Member Handout 1, Learning Topics. Let them help each other decide what their goals for the year will be.

Allow time for them to share their goals with a project friend and sign each other’s MAP Worksheets.
BEGIN TO SET GOALS IN YOUR DAIRY CATTLE PROJECT

Leader Notes

ACTIVITY

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What is your first goal for the project year?

2. What goal do you like best? Why?

Process:
3. Why are these goals important?

4. Why is it important to set goals?

Generalize:
5. What are the advantages of working in a group when setting goals?

Apply:
6. What other groups have you worked in where you needed to set goals to help you make decisions?

GOING FURTHER:
• Use the goal setting process to set group goals

REFERENCES:
Lessons on:
• Selecting Your Project Calf
• Identifying Breeds of Cattle
• Handling a Calf

Author:
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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BEGINNING TO SET GOALS IN YOUR DAIRY CATTLE PROJECT
DAIRY CATTLE, LEVEL I
Activity Sheet 3, Learning Topics

Place a check mark next to five of the topics you would like to learn about in your project.

_____ Identifying Parts of a Calf
_____ Beginning to Set Goals in Your Dairy Cattle Project
_____ Care of a Newborn Calf
_____ Housing for Your Calf
_____ Feeding a Bucket Calf
_____ Is Your Calf Sick or Well?
_____ Weaning Your Bucket Calf—And Other Management Practices
_____ Training Your Calf to Lead
_____ The Proper Way to Wash Your Calf
_____ How to Pack a Tack Box for a Show
_____ Foster Mother of the Human Race—The Dairy Cow

Think Back:
What I learned about dairy cattle so far:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What I learned about myself so far:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
BEGIN TO SET GOALS IN YOUR DAIRY CATTLE PROJECT
Care of A Newborn Calf

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to care for the newborn calf
• The value of colostrum for preventing health problems
• The importance of a good, healthy environment for the calf

ABOUT THEMSELVES:
• The value of colostrum for humans
• The importance of preventive health care
• The importance of their environment

Materials Needed:
• Bottle of tincture of iodine
• Two quart nipple bottle
• Pictures of good calf housing
• Syringes and vitamin vaccines
• Activity Sheet 4, Newborn Calf Care

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

The birth of calves on a dairy farm is a very important event because calves are the source of replacements for cows in the herd. The success of the dairy is closely related to raising good replacement heifers. Proper care of the newborn calf is important for giving the calf a good start in life.

Newborn calves can get sick real easy. Therefore, it is important to provide a clean environment for the newborn calf. A clean dry pen or a grassy paddock, when the weather permits, are the best areas for the newborn to begin its life.

Soon after a calf is born, its navel cord is broken and the calf loses its attachment from its dam (mother). The broken navel cord area allows easy access for bacteria which may cause an infection in the calf. This infection is called “navel ill.” To give the calf protection from navel ill, the navel should be thoroughly dipped in tincture of iodine. (Note: tincture of iodine should be used instead of iodine teat dip).

Another way to reduce the risk of infection is to wash the dam’s teats before allowing the calf to nurse. Bacteria on the cow’s teats can be the cause of scours in the young calf.

Leader Notes

Show members a bottle of tincture of iodine. Explain that tincture of iodine helps dry the navel cord, while iodine teat dip will tend to keep the cord moist and susceptible to infection. If possible, demonstrate dipping the navel of a newborn calf.
After making sure the newborn calf’s environment is satisfactory, the most important practice is to be sure that the calf receives at least two quarts of colostrum. Colostrum is the first milk produced by cows at calving time. It is essential to the well being of the newborn calf because colostrum contains antibodies, which are things that prevent certain diseases. Unless the calf receives colostrum within the first few hours after being born, the calf will likely become sick and may die.

The newborn calf can readily absorb the antibodies from colostrum for a few hours after being born, but this ability is seriously diminished after about 12 hours. Therefore, feeding at least 2 quarts of colostrum as soon after birth as practical is very important.

Fresh cows produce some colostrum for about two days after calving. The first milking has the highest concentration of antibodies and by far the most desirable for feeding to newborn calves. Even though the calf has very little ability to absorb the colostral antibodies after one day of age, it is still a good idea to continue to feed colostrum for two or three days because it tends to coat the intestine and helps prevent infections.

The calf should be separated from its dam soon after being born. Most successful dairies do not allow the calf to nurse its dam since there is no way of knowing how much colostrum it received.

At the time the calf is separated from its dam, an injection of vitamins A, D and E is recommended. The recommended amounts are: 500,000 I.U. of A, 75,000 I.U. of D, and 50 I.U. of E. These vitamins will help give the newborn calf a good start in life.

The next concern for giving the newborn calf a good start in life is housing. Calf housing should provide a clean, draft-free, dry environment to help keep it healthy. Good calf housing provides conditions that are comfortable for the calf and minimizes stress. We will talk about housing in the next lesson.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. Name three things you must provide or do for a newborn calf.
2. How did you put tincture of iodine on the calf’s navel?
3. What happened when you fed a calf on the bottle?

Process:
4. Why is it important to feed colostrum?
5. Why use tincture of iodine on the navel?
Generalize:
6. Human babies receive disease prevention antibodies from their mothers, but what kinds of shots do they get to prevent disease?

Apply:
7. What special conditions do new human babies need to be safe and comfortable? (Consider temperature, clothing and other environmental factors)?

GOING FURTHER:
- Visit a dairy and observe the area where calves are born and housed.
- Visit with a dairy farmer about how colostrum is fed and when the calf is separated from its dam.

REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas 1991

Author:
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:
Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
CARE OF A NEWBORN CALF
DAIRY CATTLE, LEVEL I
Activity Sheet 4, Newborn Calf Care

Number these statements in the order they occur:

_____ Give calf 2 quarts of colostrum
_____ Give injection of vitamins
_____ Dip navel cord in tincture of iodine
_____ Put calf in clean, draft-free, individual hutch
Housing for Your Calf

About the Project:
• The importance of adequate housing for their calf
• The requirements of good housing

About Themselves:
• Size of room available for them
• How they feel about their room
• The differences in housing that exists in the world

Materials Needed:
• A calf hutch
• Member Handout 1, Calf Hutch Diagram

Activity Time Needed: 30 MINUTES

Activity
Housing for your calf is a critical consideration because it affects the environment. Good housing provides a (1) dry bed, (2) is draft free, and (3) has good ventilation. If these conditions are provided, your calf should not be under any environmental stress. Several housing types are available which will provide good environmental conditions.

Calves should be housed individually to help prevent the spread of diseases; to be able to determine how much dry feed they are eating; and to prevent calves from sucking each other. Individual pens may be used in an existing building, in elevated floor crates, or in calf hutches.

Calf hutches are the most common housing system in Kansas. Hutches provide the environmental conditions necessary for raising healthy calves. And, it is the least expensive housing system.

Although a calf hutch might appear to be cold and drafty, the three solid sides of the hutch prevent wind from blowing through it.

Calf hutches should be bedded with straw or shavings to provide a dry bed for the calf. An outside pen that measures approximately 4 feet by 8 feet will allow the calf to have some exercise, and it will have enough surface area so that it will stay reasonably dry. Calves may be tethered with a dog chain and collar which will allow them to move around the hutch to get into shade. Tethering will give you a “head start” in training the calf to lead.

Leader Notes
This lesson should be conducted at a dairy farm where the calf housing can be toured. Since hutches are the most common housing system, a farm using hutches would be a logical location for the meeting.

Discuss the requirements for a good housing system and show the members how calf hutches can provide these requirements.

Encourage members to go inside a calf hutch to see how big it is and how warm or cool it feels.
HOUSING FOR YOUR CALF

Leader Notes

Hutches should be open to the south in the winter to avoid north winds and to let sunlight in during the day. During the summer, the hutch should face the north to provide more shade. The hutch could also be set on 4-inch blocks to allow more air movement.

Water should be placed on the outside of the hutch and the dry feed on the inside. This keeps the hutch drier and prevents the calf from slopping water into its feed.

Hutches should be moved to a clean spot between calves. If an empty hutch is not needed immediately, turn the hutch upside down and the sunlight will help sanitize it.

Floor pens in buildings can provide a good environment for calves if the building is well ventilated. Floor pens should be approximately 4 feet by 6 feet in size. The pens should have three solid sides with a gate for the front. This will prevent drafts and nose-to-nose contact with other calves.

Floor pens are not as easy to clean. Therefore, diseases may be a problem if this system of housing is used.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What are several important parts of the calf hutch?
2. What parts of the hutch made it comfortable for the calf?

Process:
3. How important is the direction that the open side of the hutch faces? Why?
4. What are the main things that the pen and hutch provide for the calf?

Generalize:
5. What types of shelter are needed for other animals? Why?
6. What do you consider to be important about your room at home?
7. What are some of the different types of housing used in different countries? For what reasons?

Apply:
8. Make a diagram of what an ideal kids’ room would look like. How might this change in other parts of the world?

Give each member Member Handout 1, Calf Hutch Diagram, as a reminder of the space and design needed.
## GOING FURTHER:
- Visit a dairy farm and look at the calf housing. Ask about the advantages and disadvantages of the system.

## REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas

### 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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21–Dairy Cattle, Level 1
HOUSING FOR YOUR CALF
DAIRY CATTLE, LEVEL I
Member Handout 1, Calf Hutch Diagram

(front could be totally open)

Side view of hutch

Back view of hutch

22–Dairy Cattle, Level 1
INSTRUCTIONS:
1. Nail front and back corner 2 x 4 to side by placing 2 x 4 on floor.

2. Put side on top of 2 x 4 leaving 2 x 4 down from top of side the width of a 2 x 4.

3. Nail 48 inch 2 x 6 to lower end of 2 x 4 below plyboard side.

4. Do same for other side of hut.

5. Stand sides up, nail 40 inch 2 x 4 on top of corner 2 x 4, leaving bottom of front 2 x 4 flush with front of side, and top of back 2 x 4 flush with back of side.

6. Nail 43 1/2 inch 2 x 6 at bottom on front and back of hut.

7. Nail back plyboard on.

8. Nail 10 inch 2 x 4 on inside of side flush with top.

9. Place top on hut square and nail.

10. Plane 41 1/2 inch 1 x 4 to fit under roof on front of hut.

You will need:
- Two sheets 5/8 inch exterior plyboard cut as indicated below.

• 3 — 2 x 4s, 7 feet long, cut TWO as indicated

• 1 — 2 x 6, Penta Treated 16 feet long

Cut 2 — 2 x 4s, 40 1/4 inches long
Cut 2 — 2 x 6s, 48 inches long
Cut 2 — 2 x 6s, 43 1/2 inches long
Feeding a Bucket Calf

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to teach a calf to drink from a bucket or nurse a bottle
• How to feed the correct amount of milk or milk replacer
• The importance of feeding the calf dry feed

ABOUT THEMSELVES:
• The importance of cleanliness
• How they feel about using clean food containers and silverware

Materials Needed:
• A 2 gallon plastic bucket
• A 2 quart nipple bottle
• A label from a milk replacer
• A sample of calf starter
• Member Handout 3, Recommended Calf Starter

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Your calf will instinctively nurse its mother, but nursing a nipple bottle or drinking from a bucket is a new learning experience for your calf. When teaching your calf to drink from bottle or bucket, it may be necessary for an adult or an older member to help hold the calf.

Either a nipple bottle or bucket may be used for feeding milk or milk replacer. A nipple bottle is convenient for measuring the correct amount of liquid feed. A bucket is convenient for encouraging calves to consume calf starter—place a handful of starter in the bucket just as the calf finishes drinking.

The easiest way to teach your calf to consume milk or milk replacer is to take advantage of its own instincts. Since calves will instinctively nurse, insert one or two fingers in its mouth and let the calf start sucking. Then insert the nipple of the bottle in its mouth and let it continue to suck. If bucket feeding is used, force the calf’s mouth into the bucket of milk while it is sucking on your fingers. It may be necessary for a large person to straddle the calf’s neck when starting the calf on the bucket.

Leader Notes

Show nipple bottle and plastic pail. Put a handful of calf starter in the pail.

If possible, have a newborn calf available to demonstrate the technique of teaching the calf to consume liquid feed.
During the milk feeding period, your calf will become gentler if you pet or brush it while it is feeding. This will help later when training your calf to lead.

The decision to feed milk or milk replacer will probably depend on whether or not milk is available. Most dairies have about enough waste milk (unsalable) such as antibiotic treated or high somatic cell count cows so that milk feeding is the most economical. If milk replacer is fed, it should contain at least 22 percent protein and 15 percent fat.

Follow label instructions when using milk replacer. Holding the level of liquid feed constant encourages the calf to consume calf starter as its size and appetite increase. A calf weighing about 100 pounds at birth should be fed 8 pounds of liquid (approximately 1 gallon) in two equal feedings each day. Likewise, a calf weighing 80 pounds should be fed about 6.5 pounds each day in two equal feedings.

Each calf should be fed from a separate nipple bottle or bucket to avoid spreading diseases from one calf to another. If this is not possible, thoroughly wash the nipple and bottle or bucket before the next calf is fed.

Within a few days after the calf is born, it should be encouraged to consume dry feed, both calf starter and hay, to avoid upset stomachs and prevent nutritional scours. Dry feed consumption is necessary for the calf to develop a functional rumen. In the beginning, feed small amounts of calf starter and a grass or grass-legume hay. It is important to keep the dry feed fresh, so don’t feed more than the calf will clean up in a day.

Water should be made available for the calf even though it is being fed milk or milk replacer. It is best to offer water at least 20 minutes after feeding the liquid feed.

When your calf is eating at least 1½ pound of calf starter each day, it may be weaned from liquid feed. This will usually be at about six weeks of age. After weaning, continue feeding all of the calf starter and hay the calf will eat.

**DIALOGUE FOR CRITICAL THINKING:**
**Share:**
1. Did you use a nipple bottle or bucket?
2. What problems did you have in getting your calf to drink?
3. How did it feel to have a calf suck your fingers?

**Process:**
4. What is the recommended amount of milk or milk replacer? Why should it be limited?
5. When should dry feed be offered to a newborn calf? Why?

6. Why is it important to wash the nipple, bottle or bucket after each feeding?

Generalize:
7. Why is it important for you to have clean dishes and silverware for eating?

Apply:
8. What are some important things to remember the next time you help prepare a family meal?

GOING FURTHER:
- Visit a dairy farm and watch the calf feeding operation.
- Ask a dairy farmer if milk or milk replacer is fed and why.
- Visit a feed store and ask about the different milk replacers available.

REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas 1991

Author:
James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University
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**FEEDING A BUCKET CALF**
**DAIRY CATTLE, LEVEL I**
Member Handout 2, Sample Calf Starter

Compare this sample to those actually used or purchased from a feed store. What is different? What is the same?

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, cracked</td>
<td>51.5 lbs.</td>
</tr>
<tr>
<td>Oats, rolled</td>
<td>20.0 lbs.</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>19.5 lbs.</td>
</tr>
<tr>
<td>Molasses</td>
<td>7.0 lbs.</td>
</tr>
<tr>
<td>Limestone, ground</td>
<td>1.2 lbs.</td>
</tr>
<tr>
<td>Trace mineral salt</td>
<td>0.3 lbs.</td>
</tr>
<tr>
<td>Dicalcium phosphate</td>
<td>0.3 lbs.</td>
</tr>
<tr>
<td>Salt</td>
<td>0.2 lbs.</td>
</tr>
<tr>
<td>Vitamins ADE*</td>
<td></td>
</tr>
</tbody>
</table>
| * Add (IU/lb) Vitamin A, 1000; Vitamin D, 140; Vitamin E, 20.
What Will Members Learn . . .

ABOUT THE PROJECT:
• To recognize early signs of a sick calf
• To develop good diagnostic skills
• To recognize a normal animal
• To observe closely and make comparisons

ABOUT THEMSELVES:
• Their normal body temperature
• Improve observation skills

Materials Needed:
• Slips of paper with characteristics of sick animals
• Newsprint
• Markers
• Model of calf, stuffed animal or small live calf

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Today, we are going to talk about how to recognize a sick calf and how to tell if a calf looks healthy. To be able to care for your calf, or any other animal, you must know its behavior so well that you can tell when it isn’t acting normally. This means you must become very good at watching your animal and understanding what you see. We call this observing your animal.

Healthy animals act differently from sick animals. Have you ever seen a sick calf? How does a sick calf look?

It is important that you learn to recognize the different ways a healthy and a sick calf act. And since animals are unable to talk, we must be very good observers.

If your calf has any of these signs (point to sick list), you can check to be sure it is sick by taking its temperature.

Have you ever had a fever? How did you know for sure what your temperature was? The normal body temperature of humans is 98.6°F Fahrenheit.

Record group responses on a large sheet of newsprint. Add these characteristics if children don’t identify them:
• droopy ears and head
• dry, crusty, or snotty nose
• gaunt—gone off feed or water
• diarrhea, color and smell
• rapid or noisy breathing
• bloated stomach protruding left side
IS YOUR CALF SICK OR WELL

Leader Notes

Note: using a model of a calf, stuffed animal, or small live calf that will accommodate a rectal thermometer, demonstrate while explaining the method. Let each member practice taking the temperature of a calf or model.

ACTIVITY

Let me show you the way we take the temperature of a calf. I will use a glass animal thermometer and then you can practice doing this on the model. First, you need to restrain the calf. If your animal is used to you, tying it up may be all you need to do. If not, or if it is really big, you may need to use a squeeze chute to keep it from moving around. Gently lift the tail and insert the thermometer into the rectum about 2 inches (show 2 inches on thermometer). You need to hold it there for about one minute or until you count to 60, (1001, 1002, 1003, etc.).

Stay calm and don’t move around while you are holding the thermometer in the calf or your animal will become nervous. After one minute, remove the thermometer and wipe it off quickly with a paper towel or clean rag; then read the temperature. You may need to have your parent or someone else help you do this. Sometimes it is hard to read. Write the temperature of your animal on a piece of paper so you won’t forget it.

What is your temperature when you are well? (98.6°F) A calf’s normal temperature is higher than yours. It is 101.5°F. If the calf’s temperature is higher than 102°F, you should seek help from an adult.

Another illness to watch for is called bloat. It is very much like when you have a stomachache caused by a lot of gas in your stomach. This sometimes occurs after eating food like beans. People generally have a way of relieving gas (be prepared for laughter), but sometimes calves can’t do this. What do you think might happen to the calf if it can’t pass gas? The part of the stomach where gas builds up in calves is called the rumen. You will know if this happens to your animal if its left side begins to swell, because that is where the rumen is located.

If your calf bloats, try walking it at a good pace to relieve the gas. If it is still bloated after 15 minutes of walking, call a veterinarian or someone who can help you. You must find a way to get rid of this gas, or the animal can die.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What are some of the signs of a sick calf?
2. What happened when taking the temperature of a calf or a model?

Process:
3. What problems, if any, did you have taking the temperature of a calf?
4. Why do you not put the thermometer in the calf’s mouth?
5. What is one simple way to try to get rid of bloat in a calf?

See discussion on treatment in Level III, Common Cattle Diseases: Bloat.
ACTIVITY

Generalize:
6. How is the calf thermometer different from others you have seen?

Apply:
7. What will you do different the next time you take a calf’s temperature?
8. What types of thermometers might you need for other animals?

GOING FURTHER:
• Visit a zoo or farm.
• Visit a veterinarian.

REFERENCES:
Minnesota Project Meeting Guide

Author:
Brian A. Swisher, County Extension Agent, 4-H Youth Programs, Kansas State University (adapted from “Examining a Healthy Animal,” Thomas D. Zurcher. University of Minnesota)

Edited by:
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IS YOUR CALF SICK OR WELL
Weaning Your Bucket Calf—
And Other Management Practices

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to wean your calf from milk
• How to feed your calf after weaning
• Other management practices

ABOUT THEMSELVES:
• Events in their life that cause stress
• How they feel about stressful activities

Materials Needed:
• Member Handout 3, Sample Calf Diets
• Activity Sheet 5, Calf Vaccination Schedule

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

There comes a time in your calf’s life when it must be weaned from milk. It is not practical to feed milk or milk replacer after calves are consuming enough dry feed to continue growing well. The change from a diet composed of milk and dry feed to one that is all dry feed can create some stress on your calf. This is one reason why it is important for your calf to eat calf starter and hay at an early age—so it will be somewhat adjusted to dry feed.

Weaning is a stressful experience for your calf. You may notice that your calf may bawl for milk for a couple of days, especially near feeding time. The change of its diet causes some stress, too.

Since weaning can be somewhat stressful on your calf, the only thing you should do at weaning is to discontinue feeding its liquid portion of the diet. Doing other things such as moving it to a group pen, dehorning, vaccinating, etc., can cause additional stress on your calf. Therefore, the only change that should be made in your calf’s life at weaning time is to wean it from milk or milk replacer.

Usually by the time calves are 6 weeks old they can be weaned from their liquid feeds. The key for determining when a calf can be weaned is the amount of calf starter it is eating. Calves can be weaned when they are consuming at least 1½ pounds of calf starter per day.

Note: Two commercial mixes could be used.
The amount of nutrients consumed is important to the recently weaned calf in order for it to continue growing well. Until the calf is about 3 months old, continue feeding all of the calf starter your calf will eat plus hay fed free choice. At that time, a less expensive grower mix could replace the more expensive calf starter.

About a week after your calf has been weaned, it can be moved to a group pen with six or seven other calves of similar size. Never put a recently weaned calf in a group of larger calves since small calves will not compete very well. Calves may be put into larger groups after they have made the social adjustment to competing with one another.

Your calf is going to need some shots, called vaccinations, to keep it healthy and prevent certain diseases later in life. You should consider the following vaccines: IBR-PI3, BVD, H. somnus, Shipping Fever, Black Leg, Lock Jaw, Malignant Edema, Brucellosis (if it is a heifer) and Leptospirosis. You need to visit with a veterinarian about which vaccines to use and when to use them.

Soon after your calf has been weaned is a good time to train it to lead. Your calf will not be as hard to handle at this age, and this training will be useful when it comes time to show it at the fair.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. How did your calf or others act when their liquid milk was not given to them?
2. How well was your calf eating starter ration when weaned?

Process:
3. Why is it important for your calf to be eating 1 1/2 pounds of starter ration before weaning?
4. What are the significant differences between the starter and grower rations?
5. What was the most important thing you learned about shots for your calf?

Generalize:
6. Have you ever observed a younger brother or sister when your parents decided to quit giving them a bottle? How did the child react? Was this a stressful time for your family? Why or Why not?
7. Can you remember getting various shots when you were younger (before starting school)? What were the shots for? How did you feel about getting the shots? Why do you think the shots were needed before going to school?

ACTIVITY

Pass out Member Handout 3, Sample Calf Diets, and refer the members to the calf starter mix. Pour a starter mix in a bucket. Let members feel and smell the mix. Identify grains.

Show the members the example of a calf grower mix on Member Handout 3. Pour grower mix in a bucket to examine as before. Compare the two mixes for feel, smell, etc.

Give members Activity Sheet 5, Calf Vaccination Schedule. Discuss what shots are for, when and where to give them, and why they are needed. Have members record dates for their calves.
8. What are some other times in your life that you were maybe afraid or scared? (Staying overnight away from home, sleeping in a strange place or new room, first day of school, etc.)

9. How do you think you would feel if you only did one scary thing at a time rather than several at a time?

Apply:
10. Ask a nurse or doctor to discuss weaning babies from milk and giving shots for protection.

GOING FURTHER:
- Visit a dairy and observe how calves are housed and fed before and after weaning.
- Ask a dairy farmer about the age when calves are weaned and how they are fed after weaning.
- Ask a dairy farmer about their vaccination program.

REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas 1991

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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### CALF STARTER DIET

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, Cracked</td>
<td>52.0 lbs</td>
</tr>
<tr>
<td>Oats, Rolled</td>
<td>20.0 lbs</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>19.5 lbs</td>
</tr>
<tr>
<td>Molasses</td>
<td>7.1 lbs</td>
</tr>
<tr>
<td>Limestone, Ground</td>
<td>1.0 lbs</td>
</tr>
<tr>
<td>Trace Mineral Salt</td>
<td>0.25 lbs</td>
</tr>
<tr>
<td>Dicalcium Phosphate</td>
<td>0.15 lbs</td>
</tr>
<tr>
<td>Vitamin Supplement</td>
<td></td>
</tr>
<tr>
<td>(Should supply 1000 I.U. vitamin A, 140 I.U. vitamin D, and 25 I.U. vitamin E per pound of starter)</td>
<td></td>
</tr>
</tbody>
</table>

### CALF GROWER DIET

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, Cracked</td>
<td>76.0 lbs</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>17.0 lbs</td>
</tr>
<tr>
<td>Molasses, Liquid</td>
<td>5.0 lbs</td>
</tr>
<tr>
<td>Limestone, Ground</td>
<td>1.2 lbs</td>
</tr>
<tr>
<td>Trace Mineral Salt</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>Dicalcium Phosphate</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>Salt</td>
<td>0.2 lbs</td>
</tr>
<tr>
<td>Vitamin ADE</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>1000 IU/lb</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>140 IU/lb</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>20 IU/lb</td>
</tr>
<tr>
<td>Additives (Lasalocid and/or another coccidiostat may be added)</td>
<td></td>
</tr>
</tbody>
</table>
Activity Sheet 5, Calf Vaccination Schedule

Insert dates for each vaccination.

<table>
<thead>
<tr>
<th>Vaccination</th>
<th>Insert Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Calf Born</td>
<td>___________</td>
</tr>
<tr>
<td>IBR—PI3 (2–3 days old)</td>
<td>___________</td>
</tr>
<tr>
<td>H. somnus (2–3 days old)</td>
<td>___________</td>
</tr>
<tr>
<td>IBR—PI3 (6 weeks old)</td>
<td>___________</td>
</tr>
<tr>
<td>BVD (6 weeks old)</td>
<td>___________</td>
</tr>
<tr>
<td>H. somnus (6 weeks old)</td>
<td>___________</td>
</tr>
<tr>
<td>Shipping Fever (6 weeks old)</td>
<td>___________</td>
</tr>
<tr>
<td>Black Leg, Malignant Edema, Lock Jaw (6 weeks old)</td>
<td>___________</td>
</tr>
<tr>
<td>Brucellosis (4–6 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>Black Leg, Malignant Edema, Lock Jaw (4–6 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>IBR—PI3 (6 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>H. somnus (6 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>BVD (6 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>IBR—PI3 (10–12 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>BVD (10–12 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>Black Leg, Malignant Edema, Lock Jaw (10–12 months old)</td>
<td>___________</td>
</tr>
<tr>
<td>Leptospirosis (10–12 months old)</td>
<td>___________</td>
</tr>
</tbody>
</table>
Training Your Calf to Lead

What Members Will Learn . . .

ABOUT THE PROJECT:
- To train a dairy calf to lead
- To train a dairy calf for showing

ABOUT THEMSELVES:
- The value of patience
- The importance of being kind to others

Materials Needed:
- Halters (rope and strap)
- Brush

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Your dairy calf needs to be trained for leading for two reasons: it makes handling the animal much easier and a well-trained calf will compete much better in the show ring.

Training a calf to lead is sometimes time consuming and some calves will test your patience. However, after a few short lessons, you will be amazed at how well your calf responds to your training.

TRAINING TO LEAD
If you are raising your calf from birth, there are some things you can do to help when the time comes for training the calf to lead. During the milk feeding period, your calf will become gentler if you will pet it while feeding. If your calf is housed in a calf hutch, tethering it to the hutch with a dog collar and a 6-foot piece of chain will give you a “head start” in training the calf to lead.

A good time to train your calf to lead is soon after weaning. At this time the calf is small enough to be easily controlled. If your calf has never been tied, start by tying the calf in a shed with feed and water until it is accustomed to being tied. If your calf is accustomed to being tied, a good way to train your calf to lead is to keep the calf tied in a shed where it can be fed but not watered. Then, morning and evening you can lead your calf to water. After a few trips to water, the calf will soon respond to this reward. When you return from watering your calf, reward it with feed and give it a good brushing.
In the beginning, you may need some help from someone to gently push your calf from behind. Try to lead your calf by not tugging hard on the halter. Instead, most of the pressure to encourage the calf to move should come from behind by someone pushing your calf. Remember, your calf will respond to kindness and praise better than to harsh treatment.

When tying your calf, a rope halter is OK if the calf does not struggle too much, in which case, the rope may irritate the bridge of its nose and cause a sore. A strap halter or one with some cushioning is recommended if the calf fights the halter when tied.

BEGINNING TO TRAIN
After the calf is easy to lead to water, continue keeping the calf tied and start training the calf to show. Dairy animals look best when they are walking with their heads up and taking short steps. Start leading your calf to water making it walk slowly and lifting on the chin strap to keep its head up.

Next, you need to train your calf to pose. Your calf needs to be trained to stand with its head held high when you put pressure on the halter. In addition, you should train your heifer to back by putting pressure on the calf’s shoulder with your right hand and pushing back on the halter with the left hand. This technique will be extremely useful in the show ring when you are posing your calf for the judge since sometimes you need to change the position of its feet.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What happened when you first tried to lead your calf?
2. What did you do to get your calf to lead easily?
3. How did you feel when your calf finally began to lead?

Process:
4. How do you think your calf learns best?

Generalize:
5. How do you feel when learning something new?
6. How does being kind to others make you feel?
7. How do you feel when a friend is kind to you?
8. What did you learn about being patient to others?
Apply:
9. If a calf responds better to kindness and praise, what do you think would be the best way to talk to friends or teach younger brothers and sisters something?

10. How will being patient be useful to you in the future?

GOING FURTHER:
• Attend a dairy show and observe that some animals are better trained than others for showing.
• Observe how experienced members show their animals with the head held high and walking slowly.

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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The Proper Way to Wash Your Calf

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to wash a calf
• Learn the equipment needed to wash a calf

ABOUT THEMSELVES:
• The importance of their personal hygiene

Materials Needed:
• Bucket calf
• Livestock soap
• Rubber brush
• Sponge or rag
• Wash bucket
• Rice root brush
• Scotch comb
• Water hose
• Safe place to wash your calf; wash racks
• Fly repellent or livestock dip
• Activity Sheet 6, Word Search for Washing Your Calf
• Leader’s Key, Activity Sheet 6, Word Search for Washing Your Calf

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

STEP 1:
Washing your calf can be fun. But it can also be dangerous. This is not a time for games. Move slowly so as not to frighten your calf. Put a nylon halter on your calf as a rope halter will swell once it gets wet. Tie the calf leaving only a few inches of room on the rope. This will keep the calf from moving around.

STEP 2:
Fill a wash bucket with water from the hose and add enough livestock soap to form a lather. Use only soap that is recommended for livestock. Don’t put the soap directly on the calf as it may irritate the skin and cause dandruff and scaling.

STEP 3:
Before wetting down the calf use the scotch comb and rice root brush to remove as much of the mud and dirt accumulated on the body of your calf.

Leader Notes
Using a small calf, let each member participate in the wash job doing one step at a time under close supervision.
as possible. Turn the hose on medium pressure and use your finger to form a spray or use a spray nozzle on the hose. Starting at the calf’s feet, wet down its legs all around. Then slowly wet down its underline and work up the body toward the topline. Last, wet its head, holding the ears cupped closed with your hand. Don’t get water into the calf’s ears. If water enters the calf’s ear, its ear will hang down. If the water is allowed to remain, there is danger of infection. Once again, use the scotch comb to remove any mud on the calf.

STEP 4:
Using the sponge or rag, apply soapy water from the wash bucket to the calf and scrub the calf with the rubber brush. Wash the legs and underline as well as the sides and topline. When you wash the head, again, be careful so that you don’t get water or soap in its ears.

STEP 5:
To rinse the calf, work from the top down. First, rinse the head, cupping the ears closed with your hand. Then starting at the topline, rinse the soap completely out of the calf’s haircoat. Pay careful attention to this step as any soap left will cause dandruff.

STEP 6:
Empty out the wash bucket and rinse it well. Then fill it with clean water and put one capful of fly repellant or livestock dip into the water. Carefully and slowly, pour the dip over the calf’s topline, starting at the shoulders and pouring toward the rump. Don’t pour this mixture on its head. This will cut down on the number of flies attacking your calf and will help with grooming the hair.

STEP 7:
The last step is to brush and dry your calf. Using a scotch comb followed by a rice root brush, comb the hair on the body and legs with the lay of the hair. Brush or comb until the hair is smooth.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What happened when you or your group began wetting the calf?
2. What were the easiest/hardest parts of the calf to wash? Why?

Process:
3. Why do you need to use a nylon halter when washing your calf?
4. Why is it important to use the correct type of soap?
5. Why is it important to keep water out of the calf’s ears?
Generalize:

6. Why do you think you were told to wash the calf by doing things in a special way or order?

7. Why is it important to follow directions closely when washing a calf or doing something important?

Apply:

8. Where else would you use this washing process? Discuss.

9. Why do you think your parents or teacher ask you to do certain things in a particular way?

GOING FURTHER:

• Go to a dairy show and observe cattle being washed.

REFERENCES:

Authors:
Deborah K. Lyons-Blythe, former County Extension Agent, Agriculture, Kansas State University
Twig Marston, Extension Specialist, Animal Sciences and Industry, Kansas State University

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

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

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**THE PROPER WAY TO WASH YOUR CALF**

*DAIRY CATTLE, LEVEL I*

Activity Sheet 6, Word Search for Washing Your Calf

Directions: Look for and circle the items on this list needed to properly wash a calf. Some letters may be used more than once.

<table>
<thead>
<tr>
<th>water hose</th>
<th>wash racks</th>
<th>rubber brush</th>
<th>fly repellant</th>
</tr>
</thead>
<tbody>
<tr>
<td>calf</td>
<td>scotch comb</td>
<td>sponge</td>
<td></td>
</tr>
<tr>
<td>dip</td>
<td>soap</td>
<td>bucket</td>
<td></td>
</tr>
</tbody>
</table>

THE PROPER WAY TO WASH YOUR CALF

THOWASKRACKSCALFKSO
PSWASHSHACALAFF
IUFOOUTDLOOLL
DRONOTNREESASY
KBEBEDAKKCCPR
CRASGETCAOSEO
OEHOOWOUTSTTNP
TBICHTOGBKCAEGE
SBRROSHRHPHEEL
EUHEALESTCERL
VRVTEACARORUMUA
IIFASFISWORMRNT
LAILWLTRYPTIEBSXT
THE PROPER WAY TO WASH YOUR CALF
DAIRY CATTLE, LEVEL I
Leader’s Key, Activity Sheet 6, Word Search for Washing Your Calf

Directions: Look for and circle the items on this list needed to properly wash a calf. Some letters may be used more than once.

- water hose
- wash racks
- rubber brush
- fly repellant
- calf
- scotch comb
- soap
- bucket
- dip
- sponge
- bucket

THO WASH RACKS P
PS WASHSACALAF
IU U OTDOOL
DRTNREESTASY
KB E DAKKCP t
CRASGETCAOSOE
OEHOOWOSTTNP
TBICHTOBKCAGET
SBRRSORHPHEEL
EUHEALESTCERL
VRTETACAROMUAN
IIFSISWORMTRTN
LAIWLTTERIESBSTXN

47–Dairy Cattle, Level 1
Being Prepared: 
How to Pack a Tack Box for a Show

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• To identify important items to be packed in a tack box for a dairy cattle show
• Why each item is necessary and how it is used

ABOUT THEMSELVES:
• Importance of being organized

Materials Needed:
• Tack box packed with items listed below—could be obtained from an older member
• Paper and pencils for each member
• Activity Sheet 7, Being Prepared: Packing Tack for Show
• Leader’s Key, Activity Sheet 7, Being Prepared: Packing Tack for Show

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

The tack box is a box used to carry equipment needed at a dairy show.

Water buckets: not the 5-gallon buckets, but instead a bucket that a dairy animal can get its head into all the way to the bottom.

Feed pans: one for each animal.

Show halters: calf size and cow size.

Currycomb: one for grooming when hair is long.

Rice root brush: at least one, use it to groom your animal to obtain a shiny hair coat.

Wash brush or rubber comb: use it to get your animal clean when washing—be sure it is sturdy enough to get wet.

Sand paper: to polish hooves.

Soap: you will need to use soap for washing a day or two before the show.

Leader Notes

There are many ways you could do this. If you have a packed tack box, empty it and as you refill it identify each item and explain its use—this can be done in any order. Or you could hold up an item and have members identify and explain it. You could even make a game out of it.

Give each member a piece of paper and pencil and have them list what they think are the five most important things to have in a tack box. There are no right or wrong answers. Have each member read his/her list and explain why they picked these items.
HOW TO PACK A TACK BOX

Tail comb: to tease the hair on the tail for show.

Clippers: for last minute trimming before the show.

Cloth rags and light oil: for polishing hooves and to wipe dust from hair coat.

Water hose and spray nozzle: to wash your animal.

Padlock: to lock your tack box and keep supplies safe.

Magic marker and stall cards: to hang above your animal in the stall for identification.

Extension cords: in case an outlet is not nearby when you use the clippers.

Electrical adapter: in case the outlet is not grounded.

Spare rope halters: in case the one your animal is wearing breaks.

Health Kit: contains syringe, antibiotics, etc., for your animal.

First Aid Kit: in case of minor accidents to yourself.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. How big is your tack box?

2. What is in the tack box that you use the most? Why?

Process:
3. Why do you need a tack box?

4. How important is it to be able to find things quickly? What can you do to keep the tack box organized?

Generalize:
5. How will having a well-organized tack box help you be better prepared for the next show or fair?

6. What else might you need at a show? Why?

Apply:
7. What are other uses for a tack box?

8. What other 4-H or school events do you need to plan for, to be well organized?

---

Leader Notes

List five important items for showing a bucket calf. Pass out Activity Sheet 7, Being Prepared: Packing Tack for a Show and have members complete the exercise for review.
REFERENCES:

Author:
Randy Perry, former Extension Assistant, Animal Sciences and Industry,
Kansas State University
Deborah K. Lyons-Blythe, former County Extension Agent, Agriculture,
Kansas State University

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

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

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BEING PREPARED: HOW TO PACK A TACK BOX FOR A SHOW
DAIRY CATTLE, LEVEL I
Activity Sheet 7, Being Prepared: Packing Tack for a Show

Match the item with the correct use.

<table>
<thead>
<tr>
<th>Item</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Bucket</td>
<td>To groom calf for shiny hair coat.</td>
</tr>
<tr>
<td>Curry Comb</td>
<td>For grooming when hair is long.</td>
</tr>
<tr>
<td>Rice Root Brush</td>
<td>To treat yourself for minor accidents.</td>
</tr>
<tr>
<td>Rubber Brush</td>
<td>To give your calf a drink.</td>
</tr>
<tr>
<td>Soap</td>
<td>For last minute trimming before the show.</td>
</tr>
<tr>
<td>Clippers</td>
<td>To fill out stall cards.</td>
</tr>
<tr>
<td>Padlock</td>
<td>To wash your calf.</td>
</tr>
<tr>
<td>Magic Marker</td>
<td>To help get your calf clean.</td>
</tr>
<tr>
<td>First Aid Kit</td>
<td>To lock tackbox and keep supplies safe.</td>
</tr>
</tbody>
</table>
Match the item with the correct use.

<table>
<thead>
<tr>
<th>Item</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>First Aid Kit</td>
<td>To lock tackbox and keep supplies safe.</td>
</tr>
</tbody>
</table>
Foster Mother of the Human Race — The Dairy Cow

Dairy Cattle, Level I

What Members Will Learn . . .

ABOUT THE PROJECT:
• The contribution the dairy cow makes to our diet
• How cows produce milk

ABOUT THEMSELVES:
• What dairy products are a part of their diet
• How they feel about the importance of the dairy cow

Materials Needed:
• Activity Sheet 8, Dairy Cow Quiz
• Leader’s Key, Activity Sheet 8, Dairy Cow Quiz

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

All mammals produce enough milk to feed their young, but the dairy cow is a specialized milk producer because she produces enough milk to feed her calf and enough more to supply dairy products for 25 people. Because the dairy cow makes an important contribution to our diet by supplying nutritious dairy products, she is known as “The Foster Mother of the Human Race.”

Milk and dairy products have played an important role in America’s history since 1611 when the first cows were brought to Jamestown, Virginia. Our forefathers understood the necessity of having dairy cows to furnish them with nutritious dairy products at a time when the food supply was not plentiful. The need for these same products still exists today, but we tend to take the plentiful supply of dairy products for granted because they are so readily available.

The average dairy cow produces about 14,000 pounds (1625 gallons) of milk each year. Some cows produce more than twice this amount of milk. The efficiency of the dairy cow to produce milk is the result of many years of selection for this characteristic. During the last 10 years milk production per cow has increased almost 22 percent!

The dairy cow eats about 80 pounds of feed and drinks about 30 gallons of water each day which is why she is able to produce so much milk. The dairy cow’s appetite is bigger than any other farm animal.

Leader Notes

Give each member Activity Sheet 8, Dairy Cow Quiz as a pretest to build their curiosity. Quiz can be given individually, in pairs or small groups.

Let members discuss their answers and share with each other before discussing the information in the lesson.
The dairy cow efficiently changes the feed she eats into milk for us to enjoy. She eats large amounts of forages (pasture, hay and silage) plus grain, protein supplement, minerals and vitamins to produce a large quantity of milk. About one-half of the feed eaten by dairy cows is forage. Since we do not eat pasture, hay, or silage, the dairy cow is not in competition with humans for much of her feed supply.

The dairy cow actually converts low quality feed into milk that is much more nutritious than the feed she consumed. Milk is known as an almost perfect food because of the nutrients it contains.

Milk is an excellent source of protein which is needed for growth and development. The protein of milk contains all of the essential amino acids (building blocks) required in our diet. Calcium is also generously supplied by milk for building strong bones and teeth. About 75 percent of the calcium in our diet comes from milk and dairy products. Milk is also rich in vitamins which are required for important processes in our body.

The dairy cow has four compartments in her stomach which allow her to eat and use large amounts of feed. Proteins, minerals and vitamins are carried in the blood stream and are provided to help make milk.

About half of the milk produced by dairy cows is consumed as fluid milk, either whole milk, skim milk, butter milk, or chocolate milk. The remainder of the milk supply is made into dairy products, such as, cheese, cottage cheese, butter, powdered milk, yogurt, and ice cream. All of these dairy products are excellent sources of the nutrients found in milk.

So, the dairy cow is known as the foster mother of the human race because she is able to convert raw materials (feed) into milk which is an almost ideal source of nutrients for the human race.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What do you think is the most exciting thing you learned about the dairy cow?
2. What are the main foods for the cow?

**Process:**
3. Why do you think milk is such an important food for people?
4. What other milk products do you like? Why?
5. Why do you think the dairy cow is called the “foster mother of the human race?”

Give each member a second copy of Activity Sheet 8, Dairy Cow Quiz as a post-test. Review and give correct answers.
Generalize:
6. How many dairy products do you eat each day and how important are they to you?

Apply:
7. Talk about how important the dairy cow is to the human race. How would life be different without dairy cattle and milk?

GOING FURTHER:
- Visit a supermarket and observe all of the different kinds of dairy products.

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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57–Dairy Cattle, Level 1
FOSTER MOTHER OF THE HUMAN RACE—THE DAIRY COW
DAIRY CATTLE, LEVEL I
Activity Sheet 8, Dairy Cow Quiz

Fill in the blanks of the following statements from the following list:

- ice cream 25 calcium
- ruminant 80 14,000
- vitamins protein 30
- 1611 cheese perfect
- butter

1. Some of the non-fluid products made from milk are ____________, ____________ and ____________.

2. Milk is known as an almost ____________ food.

3. Milk is an excellent source of ____________, ____________ and ____________ for your diet.

4. The average dairy cow produces about ____________ pounds of milk each year.

5. The first dairy cows were brought to this country in the year ____________.

6. The dairy cow can consume and digest large amounts of forage because she is a ____________.

7. One dairy cow produces enough milk to feed her calf and supplies dairy products for ____________ people.

8. A dairy cow eats about ____________ pounds of feed each day.

9. A dairy cow drinks about ____________ gallons of water each day.
Fill in the blanks of the following statements from the following list:

- ice cream
- calcium
- ruminant
- 14,000
- vitamins
- protein
- 30
- 1611
- cheese
- perfect
- butter

1. Some of the non-fluid products made from milk are butter, cheese and ice cream.

2. Milk is known as an almost perfect food.

3. Milk is an excellent source of protein, calcium and vitamins for your diet.

4. The average dairy cow produces about 14,000 pounds of milk each year.

5. The first dairy cows were brought to this country in the year 1611.

6. The dairy cow can consume and digest large amounts of forage because she is a ruminant.

7. One dairy cow produces enough milk to feed her calf and supplies dairy products for 25 people.

8. A dairy cow eats about 80 pounds of feed each day.

9. A dairy cow drinks about 30 gallons of water each day.
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Setting Goals for Your 4–H Dairy Cattle Project
*Dairy Cattle, Level II*

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to set goals

ABOUT THEMSELVES
• Importance of setting goals

MATERIALS NEEDED:
• Paper and pencils
• Dairy Cattle Member Guide and Annual Report (MG-38) (Available from your county K-State Research and Extension office)

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Goals should indicate growth in the project as well as the member’s learning. Each year the goals should include at least one new skill to learn.

The MAP Worksheet defines the steps that members must go through to set their goals for Level II.

Leader Notes

Have each member share one or two goals he or she met or accomplished during the last year in this project. For example: raised a bucket calf, gave a project talk, etc.

Hand out a “Dairy Cattle Member Guide and Annual Report” to each member.

Ask the members for some suggestions of what they might want to learn during the project year. Share ideas from lesson titles in Level II.

After they have developed a good list, have the members write their goals for the year on their MAP.

Have the members share their goals for the year with each other and the group. With these goals in mind, you can plan the project meetings so that the members will be able to accomplish many of their goals.
ACTIVITY

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What is one skill that you learned from your dairy project last year?
2. What is the goal for your dairy project this year?

**Process:**
3. What problems did you have with your dairy project last year?
4. Why do you think you had those particular problems?

**Generalize:**
5. Does setting goals help you solve dairy problems?
6. Does setting goals help you solve your own problems?

**Apply:**
7. How will you use goal setting the next time you plan an activity?

**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
History and Comparisons of Dairy Cattle Breeds

What Members Will Learn . . .

ABOUT THE PROJECT:
- The history of dairy breeds
- The characteristics of dairy breeds

ABOUT THEMSELVES:
- The history of their community heritage

Materials Needed:
- Member Handout 1, Breed Characteristics
- Colored photos of each of the six dairy breeds (via magazines)
- Map of Western Europe

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The recognized breeds of dairy cattle in the United States had their origin in Europe. The breeds as they were known in Europe were developed through a process of selection for many centuries. The Holstein breed originated in Europe as early as 100 B.C., while the Ayrshire and Brown Swiss breeds originated approximately 1700 A.D.

The breeds came from a small locality, and developed their own characteristics because only animals from that region were selected for breeding stock. Thus, cattle with other characteristics did not influence the characteristics of that breed. The breeds tended to be selected for certain characteristics within the region.

The Ayrshire breed originated in the shire (county) of Ayr in Scotland. Thus, the breed’s name was taken from its place of origin—Ayrshire. The cattle of Ayr were selected for their ability to thrive on less than ideal foraging conditions. Although the cattle from Ayr were somewhat short legged and blocky, they have been selected for more stature and dairy character since their importation to America in 1837.

Brown Swiss cattle were developed in a small region in Switzerland and were called Braunvieh or Schwyz. These cattle were known as Brown Swiss in the United States after their importation in 1869.
In Switzerland, the breed was developed to produce milk and meat and for pulling implements in the field. Thus, the breed characteristically was large and rugged with rather coarse bones. The breed is also known for its exceptionally good feet and legs.

The Guernsey breed was developed on the Isle of Guernsey which was one of the Channel Islands near England. The selection process began as early as 1000 A.D. Since the cattle were developed on a small island, it was rather simple to avoid the influence of other types of cattle. Guernseys were selected for their rich milk with its characteristic yellow color.

Holsteins originated in Holland in the province of Friesland. Holstein is a province in North Germany and the Holstein cattle were selected from the Friesian cattle of Holland. In Holland, the climate and soil were ideally suited for production of lush pasture. The breed was selected for its ability to produce large quantities of milk from forage. This undoubtedly resulted in the breed’s large size and body capacity. Even though the breed has a lot of dairy character, there is a good demand for Holstein steers for beef purposes. In the United States, the breed was known as Holstein-Friesians. However, Friesians was dropped from the name years ago and the breed is now known as Holstein.

Jersey cattle originated on the Isle of Jersey, another one of the Channel Islands. The selection process emphasized the production of rich milk without having to maintain a large animal. Jerseys were brought to Connecticut in 1850. For some time Jerseys were selected for their “cute” appearance, emphasizing the dished face and dark eyes.

This resulted in very little progress being made in production efficiency. During the 1960s, milk production was the important criterion for selection and the results have been larger framed, more open cows with a lot of dairy character and good udders. In fact, the Jersey breed has increased productivity faster than any of the other breeds.

Milking Shorthorn cattle originated as a beef breed in England. Some selection for milking ability was made after they were brought to the United States. For a number of years, Milking Shorthorns were considered good for both milk and meat. Later, it was realized that progress was slow when trying to select for two production traits. During the 1970s Milking Shorthorns from Australia (Illawarra) were introduced into the Milking Shorthorn breed in the United States. Since that time, the breed exhibits more dairy characteristics and milk production has improved.

Many of the “dairy cows” in the late 1880s and early 1900s in Kansas were a result of matings of dairy and beef breeds. Most farms had a few milk cows which did not look like any specific dairy breed. A lot of the cows contained Milking Shorthorn blood mixed with Guernsey, Jersey and Holstein. Thus, there were a lot of cows being milked which were described as roans, blue roans and brindles. The dairy industry is more
specialized today and the dairy cattle breeds are mostly pure. Today, only 15 to 20 percent of the dairy cattle are registered; however, almost all of the grade cattle are essentially purebred.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. Which of the dairy cows do you think are best, based on this lesson? Rank them.

**Process:**
2. Why was breeding for a “cute” head in the Jersey breed considered less important?
3. Why is breeding for two traits difficult as in the milking shorthorn?

**Generalize:**
4. What other farm animals came from other countries? Why?
5. What animals are native to North America?
6. What countries did ancestors of people in your community come from?

**Apply:**
7. What is the significance of your community heritage today?

**GOING FURTHER:**
- Plan a tour of your community to see some other breeds of dairy cattle. Observe some of the different breed characteristics. Ask why the dairy farmer selected that breed.
- Visit a dairy show and observe different breeds
- Have a genealogist talk to your group about tracing your family history.
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 Programs, Kansas State University

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8–Dairy Cattle, Level II
Note: Cut and paste breed picture with description and place in your recordbook.

**AYRSHIRE**
Strong and robust, showing constitution and vigor, symmetry, style and balance throughout, and characterized by strongly attached, evenly balanced, well-shaped udder.

**HEAD**—clean cut, proportionate to body; broad muzzle with large, open nostrils, strong jaw; large, bright eyes; forehead, broad and moderately dished; bridge of nose straight; ears medium size and alertly carried.

**COLOR**—light to deep cherry, mahogany, brown, or a combination of any of these colors with white, or white alone.

**SIZE**—a mature cow in milk should weigh at least 1,200 pounds.

**MILKING SHORTHORN**
Strong and vigorous, but not coarse.

**HEAD**—clean cut, proportionate to body; broad muzzle with large, open nostrils; strong jaw; large, bright eyes; forehead, broad and moderately dished; bridge of nose straight; ears medium size and alertly carried.

**COLOR**—red or white or any combination.

**SIZE**—a mature cow should weigh 1,400 pounds.

**HOLSTEIN**
Rugged, feminine qualities in an alert cow possessing Holstein size and vigor.

**HEAD**—clean cut, proportionate to body; broad muzzle with large, open nostrils; strong jaw; large, bright eyes; forehead, broad and moderately dished; bridge of nose straight; ears medium size and alertly carried.

**COLOR**—black and white or red and white markings.

**SIZE**—a mature cow in milk should weigh a minimum of 1,500 pounds.

**BROWN SWISS**
Strong and vigorous, but not coarse. Size and ruggedness with quality desired. Extreme refinement undesirable.

**HEAD**—clean cut, proportionate to body; broad muzzle with large, open nostrils; strong jaw; large, bright eyes; forehead, broad and slightly dished; bridge of nose straight; ears medium size and alertly carried.

**COLOR**—solid brown varying from very light to dark. Muzzle is black encircled by a mealy colored ring, and the tongue, switch and hooves are black.

**SIZE**—a mature cow in milk should weigh 1,500 pounds.
GUERNSEY
Size and strength, with quality and character desired.
**HEAD**—clean cut, proportionate to body; broad muzzle with large, open nostrils; strong jaw; large, bright eyes; forehead, broad and slightly dished; bridge of nose straight; ears medium size and alertly carried.

**COLOR**—a shade of fawn with white markings.

**SIZE**—a mature cow in milk should weigh at least 1,150 pounds.

JERSEY
Sharpness with strength indicating productive efficiency.

**HEAD**—proportionate to stature showing refinement and well chiseled bone structure. Face slightly dished with dark eyes that are well set.

**COLOR**—some shade of fawn with or without white markings. Muzzle is black encircled by a light colored ring, and the tongue and switch may be either white or black.

**SIZE**—a mature cow in milk should weigh about 1,000 pounds.

### AVERAGE YEARLY MILK PRODUCTION PER COW FOR EACH BREED

<table>
<thead>
<tr>
<th>Breed</th>
<th>POUNDS OF MILK</th>
<th>GALLONS OF MILK</th>
</tr>
</thead>
<tbody>
<tr>
<td>AYRSHIRE</td>
<td>14,500</td>
<td>1,813</td>
</tr>
<tr>
<td>BROWN SWISS</td>
<td>16,000</td>
<td>2,000</td>
</tr>
<tr>
<td>GUERNSEY</td>
<td>13,000</td>
<td>1,625</td>
</tr>
<tr>
<td>HOLSTEIN</td>
<td>19,800</td>
<td>2,485</td>
</tr>
<tr>
<td>JERSEY</td>
<td>13,000</td>
<td>1,625</td>
</tr>
<tr>
<td>MILKING SHORTHORN</td>
<td>14,000</td>
<td>1,750</td>
</tr>
</tbody>
</table>
Identifying Parts of a Dairy Animal

Dairy Cattle, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• To identify the body parts of a live dairy cow

ABOUT THEMSELVES:
• Their preferred learning method or style

Materials Needed:
• Activity Sheet 1, Parts of the Dairy Animal
• Leader’s Key, Activity Sheet 1, Parts of the Dairy Animal
• Chalkboard, butcher paper, chalk or marker

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

One of the first things for a member to learn when a dairy project is started is the name and location of the various parts of the animal.

Leader Notes

Note: Level II members should only be asked to learn 10 to 15 major parts. Use this lesson again for Level III members to learn a total of 25 to 30 parts. Level IV members should master all 45 parts.

There are a number of ways to teach this information.

(1) Distribute Activity Sheet 1, Parts of a Dairy Cow, with blank lines to be filled in by member. Have each member fill in 10 to 15 names. Use the Leader’s Key, Activity Sheet 1, Parts of a Dairy Cow, answers to discuss answers and assist members. Review and ask questions to see if members have learned the parts.

(2) Using the blank Activity Sheet 1, Parts of a Dairy Cow, or a large drawing or poster, point to a part of the animal and let members volunteer to name the part. Discuss or ask how the part should look and the part’s importance or purpose.
IDENTIFYING PARTS OF A DAIRY ANIMAL

Leader Notes

(3) Roll Call—At the beginning of the meeting, have each member answer roll by naming a part of the cow. Insist that each member name a different part. If the group is small, go through the roll more than once and in reverse order, or at random until major parts are covered.

ACTIVITY

SUMMARY
Being able to identify the parts of the dairy animal is a good beginning in learning about dairy cattle. This information will be helpful in learning what to look for in selecting dairy animals, in describing injuries or other problems and in general descriptions.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What dairy animal parts did you already know?
2. What new parts did you learn?
3. Which parts were hardest to learn? Easiest? Why?

Process:
4. Why is it important to know the parts of a dairy animal?
5. What dairy animal parts are the best indicators of a high milk producer? Why?

Generalize:
6. What techniques did you use to learn the parts of an animal that will help you to learn other things?
7. Which method of learning do you prefer? Why?

Apply:
8. How will knowing the parts of a dairy animal help you in the future?
9. What learning techniques might you use next time to learn the purpose or importance of each part in addition to the name?

GOING FURTHER:
• Members can give illustrated talks on parts of an animal.
• Tour a dairy.
• Attend dairy days and shows.
• Prepare an exhibit showing the different parts of an animal.
• Illustrate parts of an animal on a halter-broken, gentle, live animal, allowing members to touch animals.
REFERENCES:
“Dairy Cow Unified Score Card,” The Purebred Dairy Cattle Association

Author:
Larry Boleman, Extension Beef Cattle Specialist, Texas

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

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

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13–Dairy Cattle, Level II
IDENTIFYING PARTS OF A DAIRY ANIMAL
DAIRY CATTLE, LEVEL II
Activity Sheet 1, Parts of the Dairy Animal

1. ______________________ 16. ______________________ 31. _____________________
2. ______________________ 17. ______________________ 32. _____________________
3. ______________________ 18. ______________________ 33. _____________________
4. ______________________ 19. ______________________ 34. _____________________
5. ______________________ 20. ______________________ 35. _____________________
6. ______________________ 21. ______________________ 36. _____________________
7. ______________________ 22. ______________________ 37. _____________________
8. ______________________ 23. ______________________ 38. _____________________
9. ______________________ 24. ______________________ 39. _____________________
10. ______________________ 25. ______________________ 40. _____________________
11. ______________________ 26. ______________________ 41. _____________________
12. ______________________ 27. ______________________ 42. _____________________
13. ______________________ 28. ______________________ 43. _____________________
14. ______________________ 29. ______________________ 44. _____________________
15. ______________________ 30. ______________________ 45. _____________________

14–Dairy Cattle, Level II
IDENTIFYING PARTS OF A DAIRY ANIMAL
DAIRY CATTLE, LEVEL II
Leader’s Key, Activity Sheet 1, Parts of the Dairy Animal

2. Forehead 17. Mammary veins 32. Pin Bone
3. Bridge of nose 18. Fore udder attachment 33. Tail head
4. Muzzle 19. Fore udder 34. Thurl
7. Shoulder blade 22. Dew claw 37. Loin
12. Chest floor 27. Flank 42. Crops
14. Pastern 29. Thigh 44. Heart girth

15–Dairy Cattle, Level II
Selecting a Dairy Heifer

**Dairy Cattle, Level II**

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- The characteristics of a good project heifer

**ABOUT THEMSELVES:**
- Important decisions should be carefully studied
- Not to be easily influenced by things that have little importance

**Materials Needed:**
- Dairy heifer for demonstration (or)
- Large picture or photo of a dairy heifer

**ACTIVITY TIME NEEDED:** 45 MINUTES

**ACTIVITY**

The success of your Dairy Project will be influenced by the heifer calf you select to begin the project. Many projects last for less than a year, but a Dairy Project can last for several years. Therefore, the process of selecting a heifer calf for your project is a very important decision.

Several factors must be considered when selecting a heifer calf. You must remember that the winning show heifer may or may not be the most successful project. Every dairy member cannot have a heifer that wins in the show ring. However, heifers that have not been show winners can be very productive cows. Therefore, the factors used in selecting a heifer calf should include those things that are related to success in the show ring as well as those things that will affect production when your heifer becomes a cow.

The success of a heifer in the show ring is affected by the following factors: (1) general appearance, (2) dairy character and (3) body capacity. All of these factors have some affect on the productivity of the heifer when she becomes a cow.

**General appearance** considers the overall look of the animal. It considers how correct the heifer walks on her feet and legs. Also, general appearance involves how straight she is over her topline and how well her body parts blend together. The rump should have a slight slope from hips to pins. Heifers with their pins higher than their hip or with a lot of slope from hips to pins will be lacking in general appearance. The most important aspect of general appearance is the overall size of the heifer. Size is determined by height, length and width of the body.
One thing that affects the size of your heifer in comparison to the other heifers in the class is her age. Therefore, it is a good idea to select a heifer that will be one of the older animals in her class. Heifer classes are divided into senior and junior classes. Heifers born between September 1 and February 28 are in the senior class. Those born between March 1 and August 31 are in the junior class. Hence, it is a good idea to select a calf born in either September or March.

Young heifers grow fast and change fast. The older the animal is when you make your selection, the more you can predict what she is going to look like. You can be more confident of what a heifer will look like if she is 4 or 5 months old instead of 4 weeks old. Therefore, try to avoid selecting a heifer from a group of very young calves.

**Dairy character** includes those characteristics that make a heifer look like a dairy animal. It is more closely related to the future productivity of a dairy animal than any of the other type characteristics. Dairy animals should have long necks that are free from excess fat. They should be sharp over the withers and free from excess fat over the hips and pins. In addition, dairy heifers should be clean and flat in their thighs. Heifers with dairy character will be long, stretchy animals with ribs wide apart and slanted toward the rear. Their bones, as observed in their legs, will be flat and not coarse.

**Body capacity** is the total volume of the heifer’s body (length × depth × width) from the shoulders to the hips. This area, called the barrel or rib cage, goes from the top of the back to the lowest point of the body behind the front legs or chest floor. This total area should be long, deep and wide.

When selecting a heifer, avoid being influenced by things that are not related to the quality of the animal. Just because a certain heifer tends to be a pet, or has certain color markings that strike your fancy does not necessarily mean that she will make a good project.

Registered heifers are not necessarily better dairy animals than nonregistered (grade) heifers. However, registered heifers will have a traceable pedigree, while grades may not. Therefore, everything else being equal, a registered heifer is preferred.

All animals have a pedigree whether they are registered or not. The success of your dairy project may be affected by your calf’s pedigree. When selecting a heifer, select one whose dam’s milk production is higher than her herdmates and was sired by a positively proven bull. Likewise, the heifer you select should be sired by a sire that ranks in the upper 80 percentile of available sires. Heifers with these attributes in their pedigrees have good odds of being good cows.

Whether you are selecting a heifer from the family herd or from another dairy farm, compare heifers of the same age. It won’t hurt to get an
unbiased opinion from someone else. Remember, the heifer you select will be your future cow.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What are the three factors that affect the success of a heifer in the showring?
2. You should choose calves born in what month for the senior and junior class?
3. What are the important factors to consider for general appearance? Dairy character?

**Process:**
4. Why is it important to select a good heifer?
5. What characteristics are not important when selecting a heifer?

**Generalize:**
6. What are activities, professions, etc., where size is an important factor?
7. Is appearance always important? Why or why not?
8. What are some important decisions you are currently making?

**Apply:**
9. Think of a decision you will have to make in the future (i.e. classes to take, how to spend personal money, etc.). What factors will you need to consider before making your choice?

**GOING FURTHER:**
- Attend a dairy show and observe the type of heifers that are doing well in the show ring.
- Attend a dairy auction and observe the pedigrees of heifers that are in the greatest demand.
Introduction to Judging Dairy Cattle

Dairy Cattle, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• Major parts of dairy animals
• The procedure to follow in judging a class of dairy animals

ABOUT THEMSELVES:
• The importance of being able to make a decision
• The importance of being organized when making decisions

Materials Needed:
• Dairy animals for judging
• Member Handout 2, Dairy Unified Scorecard
• Member Handout 3, Dairy Judging Glossary

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Judging dairy cattle helps members learn the characteristics that contribute to a long and productive life for the cow. Dairy cattle judging also enhances the decision-making skills of the member.

The productivity of dairy cattle can best be evaluated with production records. Therefore, the most important reason for judging dairy cattle is to be able to select for type traits that are related to longevity—mammary system and feet and legs. These traits are called functional type traits because they are related to function.

Although showing dairy cattle is not as important as it once was for making improvement in dairy cattle, there still is a need to be able to evaluate those traits related to productivity and longevity. Cows with poorly supported udders and poor feet and legs usually do not stay in the herd as long as those cows with better functional type.

In addition, heifers do not have production records, except on their ancestors. For this reason, using visual observation to judge dairy cattle assists in the selection process of heifers.

The first step in learning to judge is to learn the names of the parts of the dairy cow. This is not a difficult task because most of the parts have a logical name. You must know the parts in order to be able to talk with your leader and other members about individual animals.

21–Dairy Cattle, Level II

Leader Notes

Note: Explain only the 10 to 15 major parts identified earlier in this level. Use this lesson again in Level III before the lesson on oral reasons. Level IV members can also use this lesson to complete judging terms.

This lesson should be conducted on a dairy farm where animals can be used for judging. Start by passing out Member Handout 2, Dairy Unified Scorecard.

Using a live animal, point out the various parts shown on the scorecard.

Discuss each category on the scorecard to illustrate the parts that are considered in each category.

Learn the parts over a period of time, depending on member experience.
Lead Notes

Pass out Member Handout 2, Dairy Unified Scorecard. Have members discuss the scorecard and ask questions for clarification. Refer to Member Handout 3, Dairy Judging Glossary, to help members understand terms on the scorecard.

Activity

Next, become familiar with what the ideal cow looks like. The Dairy Cow Unified Scorecard is useful for this purpose as well as looking at outstanding individuals in breed magazines. Your leader can provide you with some of this information.

Study the Dairy Cow Unified Scorecard and learn the relative points assigned to the various categories. You will learn that general appearance (frame, feet and legs) is worth 30 points and mammary system is worth 40 points, compared to 20 points for dairy character and 10 points for body capacity. The points show the importance of each of the categories.

The most important consideration for judging cows is general appearance and mammary system. Cows with poor udders or serious faults in their feet and legs should be placed in the lower part of the class. Also, thick cows who are lacking in dairy character should not be considered for the top of the class. In heifer classes, the larger heifers with good general appearance and dairy character should be in the top part of the class. Don’t place small heifers lacking in general appearance or dairy character at the top.

Since heifers do not have mammary systems which can be evaluated with any degree of accuracy, the following assignment of points is suggested: general appearance, 55; dairy character, 35; and body capacity, 10. More points have been assigned to stature (height) for heifers in the general appearance category. You will notice that the heifers at the top of classes usually are quite tall because this is an indication of their size when mature. Feet and legs are also emphasized in judging heifers because they are related to functional type.

Dairy character is also emphasized when judging heifers because this is an indication of their milking ability. You will notice thick, low-set heifers tend to be placed in the lower part of classes.

Now, you’re ready to practice what you have learned. When judging, stand at least 25 feet away from the animals. You can get a much better view from this distance. It is easier to evaluate general appearance, size and stature if you are standing far enough away to observe all of the animals at the same time. You may need to get a little closer to observe the mammary system or how sharp an animal is over the withers.

After you have observed the class, you will find most classes of four animals can be divided into a top and bottom pair or a top and bottom animal with a pair in the middle that are similar. So, judging is actually easy. You usually only have to make one or two decisions to place the class. All you need now is practice.
DIALOOGUE FOR CRITICAL THINKING:

Share:
1. What parts of a dairy cow are hard to evaluate? Why?
2. How useful was the Dairy Cow Unified Scorecard? Why?

Process:
3. What are the major differences to consider when selecting dairy heifers versus dairy cows?
4. Why is it important to develop a pattern, procedure, or sequence when judging cattle?

Generalize:
5. When do you need a procedure or pattern to do other things? List and discuss.
6. What did you learn about yourself as a result of the process in this lesson?

Apply:
7. When might you need to be well organized in the future? Why?

GOING FURTHER:
- Evaluate cows and heifers in your herd and decide what type characteristics you like best and what things you would like to change.
- Attend dairy shows and observe the kind of cattle being placed at the top and bottom of the classes.
INTRODUCTION TO JUDGING DAIRY CATTLE

Leader Notes

ACTIVITY

REFERENCES:

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24–Dairy Cattle, Level II
INTRODUCTION TO JUDGING DAIRY CATTLE
DAIRY CATTLE, LEVEL II
Member Handout 2, Dairy Unified Scorecard

MAJOR TRAIT DESCRIPTIONS

15% (1) FRAME
The skeletal parts of the cow, with the exception of feet and legs, are evaluated. Listed in priority order, the descriptions of the traits to be considered are as follows:

- **Rump**: long and wide throughout with the pin bones slightly lower than hip bones. Thurls need to be wide apart and centrally placed between hip bones and pin bones. The tailhead is set slightly above and neatly between pin bones, and the tail is free from coarseness. The vulva is nearly vertical.
- **Stature**: height, including length in the leg bones. A long bone pattern throughout the body structure is desirable. Height at the withers and hips should be relatively level.
- **Front End**: adequate constitution with front legs straight, wide apart and squarely placed. Shoulder blades and elbows need to be firmly set against the chest wall. The crops should have adequate fullness.
- **Back**: straight and strong; the loin-broad, strong, and nearly level.
- **Breed Characteristics**: overall style and balance. Head should be feminine, clean-cut, slightly dished with broad muzzle, large open nostrils and a strong jaw is desirable.

*Rump, Stature, and Front End* receive primary consideration when evaluating Frame.

20% (2) DAIRY CHARACTER
The physical evidence of milking ability is evaluated. Major consideration is given to general openness and angularity while maintaining strength, flatness of bone and freedom from coarseness. Consideration is given to stage of lactation. Listed in priority order, the descriptions of the traits to be considered are as follows:

- **Ribs**: wide apart. Rib bones are wide, flat, deep, and slanted toward the rear.
- **Thighs**: lean, incurving to flat, and wide apart from the rear.
- **Withers**: sharp with the chine prominent.
- **Neck**: long, lean, and blending smoothly into shoulders. A clean-cut throat, dewlap, and brisket are desirable.
- **Skin**: thin, loose, and pliable.

10% (3) BODY CAPACITY
The volumetric measurement of the capacity of the cow (length × depth × width) is evaluated with age taken into consideration. Listed in priority order the descriptions of the traits to be considered are as follows:

- **Barrel**: long, deep, and wide. Depth and spring of rib increase toward the rear with a deep flank.
- **Chest**: deep and wide floor with well-sprung fore ribs blending into the shoulders.

*The Barrel* receives primary consideration when evaluating Body Capacity.
INTRODUCTION TO JUDGING DAIRY CATTLE
DAIRY CATTLE, LEVEL II
Member Handout 2, Dairy Unified Scorecard, continued

15% (4) FEET AND LEGS
Feet and rear legs are evaluated. Evidence of mobility is given major consideration. Listed in priority order, the descriptions of the traits to be considered are as follows:
- **Feet**—steep angle and deep heel with short, well-rounded closed toes.
- **Rear Legs**: Rear View—straight, wide apart with feet squarely placed.
- **Side View**—a moderate set (angle) to the hock.
- **Hock**—cleanly molded, free from coarseness and puffiness with adequate flexibility.
- **Pasterns**—short and strong with some flexibility.
Slightly more emphasis placed on **Feet** than on **Rear Legs** when evaluating this breakdown.

40% (5) UDDER
The udder traits are the most heavily weighted. Major consideration is given to the traits that contribute to high milk yield and a long productive life. Listed in priority order, the descriptions of the traits to be considered are as follows:
- **Udder depth**—moderate depth relative to the hock with adequate capacity and clearance. Consideration is given to lactation number and age.
- **Teat Placement**—squarely placed under each quarter, plumb and properly spaced from side and rear views.
- **Rear Udder**—wide and high, firmly attached with uniform width from top to bottom and slightly rounded to udder floor.
- **Udder Cleft**—evidence of a strong suspensory ligament indicated by adequately defined halving.
- **Fore Udder**—firmly attached with moderate length and ample capacity.
- **Teats**—cylindrical shape and uniform size with medium length and diameter.
- **Udder Balance and Texture**—should exhibit an udder floor that is level as viewed from the side. Quarters should be evenly balanced; soft, pliable and well collapsed after milking.
FACTORS TO BE EVALUATED

The degree of discrimination (points subtracted) for each defect is related to its function and heredity. The evaluation of the defect shall be determined by the breeder, the classifier or the judge, based on the guide for discrimination and disqualifications given below.

Horns

No discrimination

Eyes

1. Blindness in one eye: Slight discrimination
2. Cross or bulging eyes: Slight discrimination
3. Evidence of blindness: Slight to serious discrimination
4. Total Blindness: Disqualification

Wry Face

Slight to serious discrimination

Cropped Ears

Slight discrimination

Parrot Jaw

Slight to serious discrimination

Shoulders

Winged: Slight to serious discrimination

Tail Setting

Wry tail or other abnormal tail settings: Slight to serious discrimination

Capped Hip

No discrimination unless effects mobility

Legs and Feet

1. Lameness—apparently permanent and interfering with normal function: Disqualification
2. Evidence of crampy hind legs: Serious discrimination
3. Evidence of fluid in hocks: Slight discrimination
4. Weak pastern: Slight or serious discrimination
5. Toe out: Slight discrimination
INTRODUCTION TO JUDGING DAIRY CATTLE
DAIRY CATTLE, LEVEL II
Member Handout 2, Dairy Unified Scorecard, continued

UDDER
1. Lack of defined halving: *Slight to serious discrimination*
2. Udder definitely broken away in attachment: *Serious discrimination*
3. A weak udder attachment: *Slight to serious discrimination*
4. Blind quarter: *Disqualification*
5. One or more light quarters, hard spots in udder, obstruction in teat (spider): *Slight to serious discrimination*
6. Side leak: *Slight discrimination*
7. Abnormal milk (bloody, clotted, watery): *Possible discrimination*

LACK OF SIZE
*Slight to serious discrimination.*

EVIDENCE OF SHARP PRACTICE
(Refer to PDCA Code of Ethics)
1. Animal showing signs of having been tampered with to conceal faults in conformation and to misrepresent the animal’s soundness: *Disqualification*
2. Uncalved heifers showing evidence of having been milked: *Slight to serious discrimination*

TEMPORARY OR MINOR INJURIES
Blemishes or injuries of a temporary character not affecting animal’s usefulness: *Slight to serious discrimination*

OVERCONDITIONED
*Slight to serious discrimination*

FREEMARTIN HEIFERS
*Disqualification*
ADDITIONAL DEFINITIONS

**Angulartity:** The appearance of being wedge-shaped from the hips to the top of the withers. Also, the ribs will be extended in a sweeping direction to the rear.

**Capped Hip:** Is the result of an injury in which the end of the hip has been broken loose from the hip bone.

**Chine:** Includes the area of the back from the withers to about half way to the hips. The other half of the back is the loin.

**Constitution:** Evidence of strength and vigor, such as width of chest, barrel and rump.

**Cropped Ear:** One or both ears are shorter than normal, usually due to frost bite.

**Degrees of Discrimination:**
- **Slight:** Minus 2 to 5 points
- **Serious:** Minus 5 to 10 points

** Freemartin:** An animal that has both male and female reproductive parts and is, thus, nonproductive.

**Lactation:** Period of time that a cow produces milk. Typically from the birth of a calf for the next 300 days.

**Mammary System:** The parts of a cow’s body that function for the main purpose of producing milk (udder, teats, milk veins, etc.).

**Overconditioned:** An animal that is too fat for good health.

**Parrot Jaw:** The lower jaw will be much shorter than the muzzle. The upper lips will protrude well beyond the lower jaw. The lower teeth will not line up with the upper gum pad.

**Winged Shoulder:** The shoulders will be especially open between the shoulder blade and the body wall or chest. The point of elbow will be out away from the body wall.

**Wry Face:** The face looks twisted in the area of the bridge of the nose when viewed from the front of the animal. The muzzle may not be in alignment with the top of the head.

**Wry Tail:** The tail head is twisted either to the right or left.
Identifying Types of Feeds and Understanding Feed Tags

Dairy Cattle, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
- Identify the five major types of feed nutrients
- Categorize feeds into roughages or concentrates
- Identify feed nutrient sources
- Identify types of feed tag information

ABOUT THEMSELVES:
- Identify five to eight human foods and whether they are a primary source for protein, energy, mineral, vitamin or water
- The importance of a balanced diet

Materials Needed:
- Five paper plates
- Various index cards with feed ingredients written on them
- Samples of feed ingredients in small jars or plastic bags
- Chalkboard, flip chart or overhead projector
- Examples of various feed tags
- Activity Sheet 2, Cereal Box/Feed Tag Quiz
- Pencils and paper

ACTIVITY TIME REQUIRED: 60 MINUTES

ACTIVITY

Proper animal nutrition is the key to a successful dairy business and a dairy project. Animals require proper nutrition for growth and development. In the same way, if we don’t get the proper nutrition by eating right, we can have health problems and our growth and development may be affected in a negative way.

Members in the dairy project should know the types of feed ingredients and how to identify various samples. Learning about the basic feed nutrients is an excellent way to prepare members to learn more about animal feed requirements and understand feed tags.

Generally, feeds are classified into two broad categories: roughages and concentrates. Roughages are typically the leafy green plants such as alfalfa and grasses, crop residues like straw from the production of grains, and silages which are green leafy plant materials that have been chopped and stored wet. Roughages are higher in fiber and less digestible than

Leader Notes

As members arrive for the project meeting, have four different samples of feed set out on a table. Ask them to work together to decide what the feeds consist of and to what animal(s) they might be fed. Encourage them to discuss their opinions together and come to some consensus as a group.

Show the samples that members looked at previously and discuss which are concentrates and which are roughages.
### Leader Notes

**ACTIVITY**

Concentrates—meaning it takes longer for the material to pass through the animal’s stomach. But young and rapidly growing animals do not have the capacity to consume enough low-quality roughage to achieve normal growth and, thus, need other nutrient sources.

Concentrates include grains (corn, wheat, barley, oats and milo), oilseed meals, (like soybean meal, linseed meal and cottonseed meal), fish meal, packing house by-products, molasses, and dried milk products. Concentrates are high in energy, low in fiber, and highly digestible—usually about 80 to 90 percent digestible.

Regardless of feed type, all feeds are sources for some of the basic types of nutrients: protein, energy sources (carbohydrates and fats), minerals, vitamins and water. Knowing what combination of these nutrients your feed supplies is critical to a good feeding program.

| **Proteins** | supply the materials necessary to make body tissues. They are the building blocks of which calf bodies are made. Proteins make up muscle, internal organs, bones and the blood. They also make up the skin, hair, hooves, and horns of a dairy animal’s body. If you feed more protein to your calf than it needs, the extra protein is used as energy—for body heat, cooling, movement, producing milk in females or for other functions. Grains such as corn, oats, and milo supply part of the protein your calf needs to grow. **Protein supplements** such as soybean, cottonseed, or linseed meal are used to balance your calf’s ration (what they eat each day). |
| **Energy** | is supplied to your dairy animal from two types of feed nutrients—**carbohydrates** and **fats**. These nutrients are to a calf what gasoline is to a car. They provide energy for growth and maintenance. These nutrients also help the animal produce heat to keep the body warm. Energy fed in excess of what the animal needs for maintenance is stored as fat until the body needs it. |
| **Minerals** | build bones and teeth and support other life functions in the calf. Livestock need a total of 16 different minerals in their diet. Calcium, phosphorus and salt make up the largest percentage of the minerals needed by the calf. Calcium and phosphorus are usually added to the calf ration for growth of bones and teeth. Many producers use bone meal or dicalcium phosphate as feed ingredients to supply these necessary minerals. Sodium, chlorine, and iodine are also critical minerals for your calf and are usually added in the form of iodized salt. Minerals that are needed only in very small amounts are called **trace minerals** and are sometimes added to salt. |
| **Vitamins** | are just as important as other feed nutrients, but they are needed in smaller amounts. Vitamin A is required for the health of skin, eyes, nose and lungs. For strong bones and healthy blood, vitamin D is needed. Other vitamins are required for numerous body functions. The calf’s body produces some vitamins while others must be added to the ration. |
ACTIVITY

Water is usually not considered to be a nutrient, but without it, life would not be possible. Many people consider water to be the most important part of the calf’s diet. Moreover, it is the cheapest part of an animal’s diet, but it is often the most neglected part, too. A calf’s body is over two-thirds water and blood is over 90 percent water. Water is also necessary in digestion and for carrying food nutrients to the rest of the body. Water carries away waste products through the urine, functions as the body’s built-in cooling system, and helps joints move. Your calf can live longer without feed than without water.

Now that we have learned something about the two feed categories (concentrates and roughages) and nutrients, let’s see how well you can classify some of the major feed ingredients according to their type.

On this table are five paper plates, each one labeled as either PROTEIN, ENERGY, MINERALS, VITAMINS, or WATER.

Alongside these paper plates are index cards with the names of various feed ingredients written on them. As a group, sort through these various feed ingredient cards and decide which plate they should be placed on. When you have finished, let me know and we will discuss your classification.

Primary Protein Sources: Cottonseed meal, soybean meal, linseed meal, corn gluten meal.

Primary Energy Sources: barley, oats, wheat, corn, milo.

Primary Mineral Sources: bone meal, dicalcium phosphate, salt, trace mineralized salt.

Primary Vitamin Sources: vitamin supplements, green pasture, alfalfa hay.

Primary Water Sources: cool, clean water. (Snow does not provide enough water to meet an animal’s daily needs for water.)

Have you ever thought about what goes into prepared animal feeds? Let’s look at these samples of feed and the tag from each feed. The tag is an important tool for us—it tells us what is in the feed.

When you study the samples, answer these questions:
• What kind of animal is this feed meant for?
• What are some of the major ingredients in the feed?
• What are the sources of protein, energy, vitamins and minerals in this feed?
• Why do some feeds include medicine?

Leader Notes

Optional: You may want to get actual feed samples from either your own supply or ask your feed dealer for samples and have the members classify these rather than the index cards.

Following their efforts, review their classifications with them. Remember to ask questions about their choices rather than being critical of their decisions. Try to discover why they placed the feed ingredients the way they did. At the same time, you can also ask them which are concentrates and which are roughages.

Arrange the feed samples on a table so that all members can gather around it. Or, divide the group into pairs and give each pair a feed sample and a feed tag.

Providing a situation and asking your members to come up with answers or a solution is an effective way to teach this kind of material. Use a teen leader or group facilitator to ask questions as the members study the samples and tags. Let members do the talking and ask questions but don’t give the answers.
IDENTIFYING TYPES OF FEEDS AND UNDERSTANDING FEED TAGS

Leader Notes

Once all groups have had an opportunity to give their explanations, use a different feed tag to help them understand how to read the information that is included. Refer back to the good points each group made and also be sure to correct some inaccuracies that they might have made.

Provide cereal boxes, Activity Sheet 4, Cereal Box/Feed Tag Quiz, and pencils; then briefly examine the cereal box labels together. Look for the requested information and, when everyone is done, compare the cereals represented for nutritional value.

Repeat this activity with a feed tag from animal feed and compare with the cereal box exercise.

ACTIVITY

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What are two feed types?
2. What are the feed nutrients?
3. What is the protein content on the feed tag for the feed you give your calf?

Process:
4. What is the main purpose of each of the nutrients? Discuss one at a time.
5. What nutrient is needed most often by a calf?

Generalize:
6. What nutrients might you find in other animal feeds?
7. Why do nutrient requirements vary for different ages of animals?

Apply:
8. Where else do you find nutrient information?
9. What nutrient will you look for on the label of the next bag of feed you buy for your calf?

GOING FURTHER:
• Arrange a trip to a local feed mill to see how the feed ingredients are weighed and mixed together to make a complete ration.
• Have members make lists of essential nutrients found on the feed tag. Does each feed provide all nutrients?
References:

Author:
This lesson was modified from original material adapted from Identifying and Classifying Feed Ingredients, Thomas D. Zurcher, University of Minnesota, by Kirk A. Astroth, Extension Specialist, 4-H Youth Programs, Montana State University, with further adaptation by:
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Cereal manufacturers are required to include “Nutrition Facts” on the box. The label includes a list of ingredients which are listed in order from most to least. It also lists percentage of daily value, amounts of some nutrients per serving, serving size, and servings per container.

1. Name of cereal

2. Main ingredient

3. Serving size  
   Servings per package

4. Which vitamins are listed?

5. Does this cereal provide all of your daily value (100 percent) for any of the nutrients?

6. Which nutrients increase when milk is added?

7. Which nutrients are minerals?

8. Repeat this exercise using an animal feed tag. Compare and discuss the answers.
Recognizing Healthy Dairy Animals

**Dairy Cattle, Level II**

What Members Will Learn . . .

**ABOUT THE PROJECT:**
- Identify normal habits, attitudes and behaviors of a dairy animal
- Recognize the color and conditions of a normal animal’s body characteristics
- The importance of vital signs in measuring animal health

**ABOUT THEMSELVES:**
- To become more sensitive of others by observing their own behavior and appearance

**Materials Needed:**
- A healthy dairy animal
- Thermometer
- Member Handout 4, Animal Health Record Sheet
- Activity Sheet 3, Healthy and Sick Animals
- Leader’s Key, Activity Sheet 3, Healthy and Sick Animals

**ACTIVITY TIME NEEDED:** 60 MINUTES

**ACTIVITY**

It is important to learn to recognize an animal’s normal characteristics in order to recognize when a characteristic becomes abnormal.

**Habits, Attitudes and Behavior**

An animal exhibits many different attitudes during one day and throughout its lifetime. A change in attitude can be a sign of disease. Attitude may also be called mental condition, state of mind, disposition, or temperament. Behavior is the manner by which attitude is exhibited or displayed. The types of behavior that are indicators of attitudes are:

1. Stance/Posture
2. Movement/Gait
3. Appetite/Eating Habits
4. Voice

The different attitudes of animals that are displayed:

1. Hungry 6. Confused
2. Nervous 7. Stubborn
3. Excited 8. Angry
4. Cautious 9. Sad
5. Frightened 10. Happy

**Leader Notes**

Pass out Member Handout 4, Animal Health Record Sheet, to each member. Have them note observations on worksheet. Note: Most useful when beginning with a sick animal.

Observe a normal, healthy dairy animal and the four types of behavior exhibited or videotape these animals.

Note whether it is normal or abnormal. Observe animal and any attitudes displayed.
ACTIVITY

Leader Notes

Observe a healthy dairy animal’s hair coat, skin, mucous membranes, feces and urine for normal color and condition.

Hand out Activity Sheet 3, Healthy and Sick Animals.

Use a rectal thermometer to determine the body temperature of a healthy dairy animal.

Have a member try to count the respiration rate of a live animal.

Body Characteristics
Evaluation of body characteristics of a dairy animal can be determined by the color and characteristics of the:

1. Hair Coat
2. Skin
3. Mucous Membranes
4. Body Discharges
5. Degree of Fatness

To determine an animal’s body characteristics, one will need to do more than listen and watch the animal as can be done to determine behavior and attitude. One will need to touch the animal. While touching the animal, the hair coat, skin, mucous membranes and degree of fatness can closely be examined. Mucous membranes line all body openings such as the eyelids, nostrils, mouth, anus and vagina. These tissues should be moist and pink. Abnormal color and conditions are:

1. Dry, flaky skin
2. Dry, rough hair coat
3. Dull hair coat
4. Pale mucous membranes
5. Yellow mucous membranes

Body discharges are excellent indicators of an animal’s health. Feces and urine should be normal in color and consistency. Feces are normally firm and dark brown or green. Urine is normally clear and yellow as opposed to bloody or milky white. Any deviation from normal may be an early sign of digestive or urinary disease.

Measurable Vital Signs
If you have observed signs that your animal is not well, there are several checks you can make to verify your observations. Body temperature, pulse, and respiration rate are measurable vital signs of a dairy animal. A rectal thermometer is used to determine an animal’s body temperature. A reading of 101.5°F is normal for cattle. An elevated reading can indicate fever which may be caused by anemia, cold weather, shock, or terminal illness.

Pulse and respiration rates of animals are determined by using a stethoscope. Normal pulse rate for cattle is 60 beats per minute and 20 inspirations/expiration per minute for normal respiration rate. Rates faster or slower than normal can indicate an abnormal condition.

SUMMARY
Recognizing that a dairy animal is healthy can usually be done by observing and recording characteristics of attitudes, behavior, body condition and vital signs. A systematic method is a physical exam.

Knowledge of a healthy animal makes it easier to recognize an animal with health problems, and treatment can be started quickly.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What are the normal habits, attitudes and behaviors of healthy dairy animals?
2. What abnormal characteristics did you observe in sick animals?

Process:
3. How can you verify if a calf is ill?
4. What weather changes might cause a calf to become ill?
5. What are some of the costs of a sick animal? Direct or cash? Indirect?

Generalize:
6. What is the affect of a sick calf compared to an entire herd or a large group of dairy animals?
7. How do you recognize illness in other animals?

Apply:
8. As a result of this lesson, how will you react to signs of illness in the future? Why?
9. What can you do differently to better prepare you to identify illness symptoms in the future?

GOING FURTHER:
- Visit a pen or herd of dairy cattle and observe healthy and unhealthy animals.
- Conduct a physical exam on a dairy animal at regular intervals.
- Record observations and data on an animal health record sheet for one week.
- Visit a veterinarian and use the stethoscope to measure pulse and respiration rate on dairy cattle.
- Videotape signs of healthy and/or sick animals.
Leader Notes

ACTIVITY

REFERENCES:
The Normal Animal—4-H Member Guide—Vml.1 10
The Normal Animal—Leader Guide—Vml.120

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40–Dairy Cattle, Level II
By recording information at regular intervals on this chart you will gain experience in animal observation skills.

1. Record normal (N) or abnormal (A) for behavior and body condition characteristics.
2. Record a check (✓) for attitude characteristics displayed.

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RECOGNIZING HEALTHY DAIRY ANIMALS
DAIRY CATTLE, LEVEL II
Activity Sheet 3, Healthy and Sick Animals

MATCHING EXERCISE
(Draw a line from the sign to the correct animal condition.)

humped-back

snotty-nose

HEALTHY
frisky
yellow, runny feces
slow-moving
doesn’t come to feeder
ears forward, alert

UNHEALTHY
shiny hair coat
skinny
moist nose
MATCHING EXERCISE
(Draw a line from the sign to the correct animal condition.)

HEALTHY

- humped-back
- snotty-nose
- frisky
- yellow, runny feces
- slow-moving
- doesn’t come to feeder
- ears forward, alert

UNHEALTHY

- shiny hair coat
- skinny
- moist nose
How to Give a Shot

*Dairy Cattle, Level II*

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- The different types of shots given to cattle
- How to give intramuscular, intravenous and subcutaneous shots to cattle
- How to identify various syringes

**ABOUT THEMSELVES:**
- Sometimes it is necessary to get a shot to ensure good health.
- It is important to use medicines or drugs according to the directions.

**Materials Needed:**
- Disposable 100 cc syringes (1 per group)
- Disposable needles (1 per group)
- Various sizes of disposable syringes
- Various glass and metal syringes
- Bananas (1 per group)—oranges may be used if unavailable
- Water in a cup (1 per group)

**ACTIVITY TIME NEEDED:** 30 MINUTES

**ACTIVITY**

Just like people, cattle must receive shots in order to stay healthy. There are many different kinds of shots and each kind has its own way of working on the calf’s body. Some vaccines work best when they are inserted just below the skin, but not into muscle. Some should be given into the muscle and some are even given directly into the vein. We’re not going to talk about which ones go where, because there are so many, instead we’re going to talk about the places to give the shot.

There are many kinds of syringes used to give shots. Some are plastic and are used a few times and thrown away. Some are glass and metal and can be washed and used many times. There are also many sizes of syringes, because some vaccines only need a small amount given to the calf to be effective, but others and some medicines, need a large quantity to be effective on a large calf.

We are going to use real needles and syringes to learn how to give shots, today; so you must be very careful. Do not play with them, they are sharp and will puncture your skin. The banana has a thick skin just like a calf and we can use it to learn how to give shots.

**Leader Notes**

Show the different kinds of syringes, but do not pass them around. Set up a display table where the members can see the syringes after the lesson.
The first shot we'll give is intramuscular or IM. “Intra” means within, and “muscular” is the muscle, so intramuscular means within the muscle. When we insert the needle, it needs to go through the skin and inside the muscle of the calf. This shot is for medicine or vaccines that must be absorbed slowly by the calf. Intramuscular shots are usually given in the neck of the animal.

Taking turns and being very careful, let one person in the group take the cap off the needle. Holding the needle facing the table top and away from people, pull the plunger back to fill the syringe with air. Push it out to get the feel of the syringe. Then place the end of the needle into the cup of water and pull the plunger back again to fill the syringe with water. Now, pick up your banana. Insert the needle through the skin of the banana and into the soft “meat” of the fruit. The needle should go into the banana nearly the full length of the needle. Holding the syringe steady, push the plunger in slowly so that you release a little water into the fruit. Don’t release very much as the fruit isn’t big enough to hold much extra water. When you’ve released the water into the banana, let go of the plunger and holding the syringe, pull it slowly out of the banana. Put the cap back on the needle and hand it to the next person in your group. Be sure everyone understands the danger of the needles and do not let anyone misuse them.

The next shot is called subcutaneous. “Sub” means under or below and “cutaneous” is the skin. So “subcutaneous” means under the skin. This shot is not to be given in the meat of the calf, but just under the skin. So when we practice, we need to be careful that we only get the water under the skin of the banana. It is most common to give this shot in the neck of an animal.

Carefully take the cap off the needle (there should still be water in it from the first time) and pick up the banana. Holding the syringe at a slight angle with the banana, slowly insert the needle into the skin and slide it just under the skin of the fruit, not into the meat. Holding the syringe steady, slowly release a little water into the fruit. Then withdraw the needle and put the cap back on and hand it to the next person in the group. Be sure everyone understands the danger of the needles and do not let anyone misuse them.

The last shot is called intravenous. “Intra” means within and “venous” means the vein. So what does “intravenous” mean? It means within the vein. This may be used to draw blood from the calf or give medicine that must get into the system very quickly. The vein that is usually used to give an intravenous shot is the jugular vein in the neck of the animal alongside the throat.

Pick up your banana. The edge that runs along the side of the banana is going to be the vein for us today. So you will want to insert the needle into the vein, but not through it. Carefully take the cap off the needle and
hold the syringe at a slight angle to the banana. Push the needle through the first layer of skin and slowly push it along the vein until most of the needle is buried in the skin. Do not get under the skin as in the last shot, you should still be inside the skin and in the corner of the banana. Slowly release some water into the banana and withdraw the needle and put the cap back on. Now let’s review these shots and the locations we give them on a live calf.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What happened to the banana after each type of shot? How did it look? Was there a different feel when handled? Why?
2. Which shot was most difficult? Easiest?
3. What type of shots (injections) did your calf need? Why?

Process:
4. What problems did you have while giving the shots? Why?
5. Why is it important to give a shot (injection) in the correct place or manner?
6. Which type of shot is absorbed fastest? Slowest? Why?

Generalize:
7. How important are shots, vaccinations, or injections in other animal projects?
8. When have you needed a shot? Why did you need it?

Apply:
9. How will understanding shot location help you understand the purpose of the medicine in the future?
10. What can you do different next time to make it easier to give each type of shot?

GOING FURTHER:
- Visit a veterinarian and watch them give shots to live animals.
- Visit each member’s calf and give them the shots they need at the beginning of the year. Let the member give the shots to their own cattle so you can supervise.
- Have group members give demonstrations on giving shots at the club meeting or the project meeting.
Leader Notes

ACTIVITY

REFERENCES:
Kansan Beef Cattle Handbook

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

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

Reviewed by:
James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University
Marcia McFarland, Extension Specialist, 4-H and Youth Programs, Kansas State University

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48—Dairy Cattle, Level II
What Members Will Learn . . .

ABOUT THE PROJECT:
- The cause of scours
- Treating a scouring calf
- Preventing scours

ABOUT THEMSELVES:
- Nutrition plays an important role in healthfulness
- Sanitation is important in disease prevention

Materials Needed:
- Package of electrolytes
- Labels from milk replacers
- Raising Dairy Heifers, C-721, your local K-State Research and Extension county office

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

The best treatment for scours is prevention! A good scours prevention program is based on good sanitation. The milk feeding equipment needs to be thoroughly washed after each feeding to avoid a build up of micro-organisms that might cause scours. Use individual bottles or pails to feed each calf. The housing must provide clean and dry conditions, and calves should not have contact with each other.

The proper amount of milk or milk replacer needs to be fed to avoid overfeeding which might cause a digestive upset. If a milk replacer is fed, it should contain at least 12 percent fat and 22 percent protein. Also, the protein and carbohydrate should come from milk products such as dried skim milk, dried whey, whey protein concentrate, dried buttermilk, etc. Milk replacers containing grain products usually will not be digested as well as those made from milk products.

In some herds, a vaccination program is required to prevent calf scours. Vaccinating dry cows and springing heifers with E. coli, Rota virus, and Corona virus vaccines may be required. Consult with your veterinarian regarding these vaccines.

If your calf develops scours (diarrhea), its growth rate will be reduced and it may even die. Therefore, a scouring calf is very ill and immediate attention is required.

Leader Notes

Pass out Raising Dairy Heifers, C-721. Show the members the pictures of good housing in the publication.

Show members a label from a milk replacer. Observe the guaranteed fat and protein percentages. Read the list of ingredients to determine if the protein and carbohydrate are coming from milk products.
Calf scours may be caused by one or more of the following factors: bacteria, viruses, nutritional or environmental factors. The diarrhea causes dehydration, a loss of water and minerals from the body. An irritation to the digestive tract caused by one of the above factors results in inefficient digestion of food. Scouring calves are usually losing body weight because of dehydration, and are unable to digest their food well enough to maintain or gain body weight.

The greatest concern for a scouring calf should be to replace the loss of minerals and avoid body weight loss. Therefore, the immediate treatment should be to replace the lost minerals by feeding an electrolyte solution in addition to milk or milk replacer.

Effective electrolyte powders for mixing with water are available from your veterinarian. The electrolytes should be mixed according to instructions and fed 10 to 15 minutes after the milk or milk replacer is fed. It is important not to feed the electrolyte solution immediately after the milk feeding since the solution will dilute the milk too much and will affect the digestive enzymes.

Since a scouring calf’s digestive system is upset, the feeding schedule should be changed to avoid overloading the system. Milk or milk replacer should be fed at the rate of 1 percent of the calf’s birth weight, but this total amount should be divided into four equal feedings. A good feeding schedule would be: morning, noon, evening, and at bedtime. The same amount of electrolyte solution should be fed approximately 15 minutes after the milk.

When the scouring condition begins to subside, the number of feedings can be reduced to three times per day and then two times per day. Then, the use of the electrolyte solution can be withdrawn during a three-day period.

If the scouring condition does not improve within two to three days, or if the condition becomes worse, contact a veterinarian.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What does a calf with scours look like?

**Process:**
2. Why do you think scours is such a serious problem?

3. Have your calves had diarrhea? What was the cause? How did you cure it?

**Generalize:**
4. One cause of diarrhea in humans is unclean dishes or baby bottles. What can you do to be sure food containers are clean?
5. What conditions might cause a digestive upset for human babies?

6. Have you noticed that overeating or eating certain foods may cause a digestive upset? What foods cause you to have an upset stomach?

**Apply:**

7. How will this lesson in sanitation affect choices you make in the future?

8. What other problems in life are better if you use prevention to take care of them?

**GOING FURTHER:**

- Visit a dairy farm and observe how calves are fed and housed.
- Ask a dairy farmer how scours are treated.
- Visit with a veterinarian about the use of electrolytes in the treatment of scours and vaccines for the prevention of scours.
- Visit a feed store and observe the different milk replacers available with regard to their nutrient content and ingredients.

**REFERENCES:**

Raising Dairy Heifers, C-721, K-State Research and Extension
Scouring Calves Require Energy and Fluids, Hoard’s Dairyman, page 28, 1-10-92

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**Reviewed by:**

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

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IS YOUR CALF SCOURING?
Common Cattle Diseases:
Ringworm and Warts
*Dairy Cattle, Level II*

What Members Will Learn . . .

ABOUT THE PROJECT:
- The basics of ringworm infection and warts in cattle
- How to control ringworm and warts

ABOUT THEMSELVES:
- What it means to have a contagious disease
- Importance of prevention

Materials Needed:
- Picture of calf with ringworm or warts (or live animal)
- Curry comb and brush
- Soapy water
- Tincture of iodine
- Plastic gloves
- Vaccines
- Petroleum jelly
- Castor oil
- Surgical knife
- Cotton balls
- Adhesive bandages
- Tape

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Ringworm
Unlike other cattle diseases, ringworm does not affect the performance of cattle, but instead causes unsightly patches on the skin of the animal. In addition, this disease is contagious to humans. Ringworm is a problem on show animals, so it is necessary to treat for this common disease.

Most commonly seen in winter, ringworm is a contagious disease that affects the outer layer of skin. Normally, it is seen as round scaly areas nearly devoid of hair on the head, neck and root of the tail of cattle. Ringworm is caused by microscopic molds or fungi and can easily be transmitted to people.

Most ringworm outbreaks are found in areas of the body that are combed. Combs and brushes become the major culprits, picking up the fungus from infected animals and spreading it to the entire show string.

Leader Notes

Show picture of calf infected with ringworm, or show live calf, but be careful that the members are not subjected to infection. Show the proper way to treat for ringworm with water, soap and iodine. Show plastic gloves. Show materials that can be used for treatment as they are mentioned.
Show the proper way to treat for ringworm with water, soap and iodine.

Because of the unsightly appearance of the show cattle with ringworm, it becomes necessary to treat it. The first step is to remove the scabs on the affected area and clean it well with soap and water. Then thoroughly apply iodine to the area.

Show plastic gloves.

When treating an animal for ringworm, be careful because it is contagious to humans. Use plastic gloves and wash your hands with clean water and soap immediately after treatment.

Show pictures of warts or show live animal with warts.

Warts

Although they usually don’t directly affect performance of cattle, warts do detract from the appearance of show cattle. In severe cases, warts may develop extensive lesions, cause cattle to lose weight and develop secondary bacterial infections.

Warts are skin tumors commonly found on the shoulder, neck or head region of cattle less than 2 years old. Warts are more often seen in the late winter and early spring. They are thought to be due to the low sterilizing effect of winter sunlight, and lowered natural resistance at this time of the year due to weather stress.

Because they are so contagious, warts can be a real problem on show cattle because they detract from the calf’s appearance. If one calf in your show string has warts, you should treat for them soon, before the rest of your show cattle contract warts. There are a few different treatments for warts in cattle. A wart vaccine is usually very effective in removing warts from yearling cattle. Daily application of either castor oil or petroleum jelly will speed up the reabsorption of warts. Warts may also be removed surgically by a veterinarian or someone with experience.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. Have you ever had or been around cattle with ringworm or warts? What did or should you do?
2. What was most difficult to understand about ringworm and warts? Easiest?

Process:
3. What causes ringworm? Warts?
4. How contagious are these two diseases and how do they spread to other animals?
5. When do these diseases occur most? Why?

Generalize:
6. How might these diseases affect other animals?
7. What is the potential for these diseases to affect people? Why?
ACTIVITY

Apply:

8. How will you act differently the next time you see or discuss ringworm or warts?

9. What can you do differently in the future to prevent these diseases?

GOING FURTHER:

- Visit a local veterinarian and see how to treat for ringworm and warts.
- Visit a local dairy and see and talk about cattle with warts and ringworm. Ask how they treat this problem.
- Visit a local dairy cattle breeder who actively shows cattle during the winter months, and see how they treat for warts and ringworm.
- Visit a local health care center and see how much of a problem ringworm is in humans and what the treatment is.

REFERENCES:

*Kansas Beef Cattle Handbook*, Animal Sciences and Industry, Kansas State University, Manhattan, Kansas


Author:

This lesson was modified from original material authored by Terry Weedon, Extension Assistant, Animal Sciences and Industry and Deborah K. Lyons-Blythe, former County Extension Agent, Agriculture, Kansas, with adaptation by:

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Edited by:

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

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What Members Will Learn . . .

ABOUT THE PROJECT:
- The four working parts of a rope
- How to tie at least four basic farm knots
- To understand the importance of tying knots that hold but that are also easy to untie
- To name a situation in which a knot might be most useful

ABOUT THEMSELVES:
- To develop learning-by-doing skills to enhance self concept
- To improve ways of getting along with others

Materials Needed:
- 3 to 4 feet of rope for each youngster. The white braided cord sold almost everywhere for curtain pulls or blinds works best—it is fairly flexible and yet holds the shape of a knot well enough so youngsters can see its construction clearly
- Member Handout 4, Knot Patterns
- Chairs or other objects on which to tie knots
- OPTIONAL: A knot board which illustrates the major knots displayed

ACTIVITY TIME REQUIRED: 60 TO 120 MINUTES

ACTIVITY
The tying of knots does not come naturally, like eating or watching TV. Tying knots, like playing a guitar, driving a car, or hammering a nail without hammering your thumb, takes practice. You will find that tying knots will require at least some practice before you can tie them easily, quickly, and without having to think about what you are doing. And like any skill, if you don’t continue to practice it, you forget some of what you have learned.

The ability to tie a variety of knots is a useful skill to have when working with dairy animals. Not only do you need to know how to tie knots that will stay tied, but it is also useful to be able to tie a knot that you can untie relatively easily after pressure or strain has been put on the knot. The mark of a good knot is one that is easy to tie, stays tied when you want it to, but is also easy for you to untie after the knot has done its work. It might be best to start off with some definitions so that we can easily communicate about how to tie knots. This will make tying knots easier if
Leader Notes

Refer to the diagrams on Member Handout 4, Knot Patterns.

Even though most people know how to tie this knot—even young children—you will probably need to demonstrate it for them.

Show how, then allow them to try.

ACTIVITY

we can remember the part we’re referring to. The end that we will be tying knots with will be called the **working end**. Normally, the remainder of the rope that we don’t use for knot-tying is called the **standing part**. When we put a bend in a rope, it is called **taking a bight**. When a rope crosses over itself, it is called a **loop**.

Sometimes ends of rope will unravel. To prevent this, the cut ends must be whipped, dipped, or burned, depending on the type of rope you purchase. Most synthetic ropes can simply be burned to prevent any unraveling.

**THE OVERHAND KNOT**

The easiest knot to tie—and one that most of you are probably familiar with—is the simple overhand knot. This is the knot that you make to tie your shoes. The purpose of the overhand knot is to prevent the rope from slipping through something. Although it is one of the simplest knots to tie, it is also one of the least useful when used by itself. It is the first step in the formation of more complex knots, however.

To tie an overhand knot, make a loop, then bring the working end over and around the working part, pass it through the loop, and draw it tight. Let’s practice this so that everyone understands.

**THE SQUARE KNOT**

The square knot is a more useful version of the overhand knot. In fact, the square knot is just two overhand knots—one tied on top of the other. Tied correctly, it is an excellent knot for joining two pieces of rope with equal or nearly equal thickness, or for tying the ends of a single rope together to form a loop. In raising animals, the major use of square knots is to tie or secure gates.

To tie a square knot, start by tying an overhand knot. Next, tie another overhand knot on top of it, but this time in reverse in such a way that each end comes out alongside its own working part. Demonstrate both ways, emphasizing the difference.

**QUICK RELEASE KNOT**

The quick release knot (also known as the bowknot or the reefer’s knot) is the standard knot used to tie an animal to a post or fair stall. Like the square knot, it is a good non-slip knot with which to tie ends of rope together. It has the added advantage, though, that it can be untied under tension—an important feature of any knot used to restrain livestock.

To tie a quick release knot, the steps are identical to those used in tying the square knot: a simple overhand knot, coming from right over left (1).

Now, begin to tie the second overhand knot, coming from left to right, by laying the new left-hand strand over the new right-hand strand (2).
ACTIVITY

Instead of inserting the running end of the new left-hand strand into the loop formed by the crossing strands, form a bight, or small loop, in the new left-hand strand and insert it into the loop (3).

Grasp the bight with the thumb and index finger of your right hand and pull it part way through the loop.

Grasp the left-hand strand and left working end in your left hand and the right-hand strand in your right hand. Pull to shape and secure the knot. Be certain that the end of the bight is “trapped” in the center of the knot.

Some animals have a habit of biting on the knots restraining them and freeing themselves. To prevent this with the quick release knot, insert the running end of the rope into the bight.

In an emergency, the free end of the bight can be pulled sharply, immediately releasing the knot.

Let’s all practice tying a quick release knot.

THE BOWLINE KNOT

Knot users, from livestock producers to seafarers, consider the bowline knot one of the most useful knots. It is a non-slip knot, and as such it can be used to form a loop that will not tighten or draw down when placed around an animal’s body or a post. Moreover, it is relatively easy to untie.

To tie a bowline knot, position the rope so that the standing part is to your left and the working end to your right. Form a right-hand loop by passing the working end of the rope over the standing part.

Secure the loop by positioning the strands where they cross between the thumb and index finger of your left hand (1).

Insert the working end of the rope into the loop from the back (2).

Cross the working end over the top of the standing part and wrap it around the rear of the standing part (3).

Re-insert the working end into the loop from the front (3).

Grasp the working end of the rope and the right-hand strand of the loop in your right hand, and the standing part of the rope in your left hand. Pull to shape and secure the knot (4). The size of your loop will depend on the amount of working end originally allowed for use.

The following story will help you remember how to tie a bowline knot. If you consider the first loop to be a “rabbit hole,” the standing part to be a “tree,” and the working end to be the “rabbit,” remember that the rabbit comes out of the hole, runs around the tree, and goes back down its hole.

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59–Dairy Cattle, Level II
DOUBLE HALF HITCH KNOT
The double half hitch knot is an extremely useful knot for the handler of livestock. It is quick, easy to tie, acts like a slip knot, and provides a convenient way to tie up the end of a rope when no other knot seems appropriate.

Begin by positioning the standing part of the rope to your left and grasp the working end of the rope in your right hand. Pass the running end of the rope over or around the post.

Bring the running end over the standing part of the rope, under it, and then insert it into the loop (the one around the post) from the bottom. Repeat this same step again to form the second half of the hitch.

THE HONDA KNOT
A honda is a small loop secured into the working end of a rope through which the standing part of the rope passes as it forms a much larger loop. Most lariats come with the honda knot already tied into an end. A few are manufactured with a quick release honda tied into the end. Bulk ropes or broken lariats must have honda knots retied into their ends.

Start by tying an overhand knot tightly into the end of the rope. Approximately 8 inches below this, tie another overhand knot, only this time leave it in the loosened state.

Grasp the loose overhand knot in your hands and study it until you have determined how to orient it so that the working end of the rope comes out from the loop and toward you. From there, it runs upward to the end knot. Grasp the running end of the rope and bend it so that it lies over the bend of the overhand knot loop.

Insert it into the overhand knot loop between the bend of the loop and its own standing part. Study the diagram on the handout because it is easy to place the running end improperly.

CONCLUSION
I have provided each of you with a handout picturing the knots we have started practicing. You should continue to practice so you will be able to tie these knots automatically.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. Name and explain the four working parts of a rope.
2. Name four basic knots.
3. Which knot was easiest? Most difficult?
ACTIVITY

Process:
4. What was your most common problem when trying to tie knots?
5. Why is it important to know how to tie knots?

Generalize:
6. What knots do you use with other projects? Why?
7. What is the easiest way for you to learn to do something with your hands? Why?

Apply:
8. What other times will knot tying be helpful?
9. How can you help your friends learn to tie knots?

GOING FURTHER:
• Conduct a knot relay. Divide your members into two or more teams. Have each member of each team tie a particular knot you call out. The first team finished wins.
• Situation Relay. Instead of telling members which knot to tie, give them a situation requiring a particular knot. They then choose a knot, tie it, and tell why they chose that particular knot. Repeat for the next member.
• Conduct a Knot Demonstration. Knot tying makes an excellent demonstration topic for members. Let each member or team of two members draw the name of a knot from the hat. Ask them to prepare and give a demonstration for the rest of the members. Allow about 15 minutes preparation time. As the leader or junior leader, you may want to move from group to group to answer questions and provide support.

(The above activities were taken from 4-H Project Meeting Guides, Agricultural Extension Service, University of Minnesota, 1983).

REFERENCES:
The Handbook of Knots and Splices, Gibson (1976).
The Encyclopedia of Knots and Fancy Rope Work (1946).
Leader Notes

ACTIVITY

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62–Dairy Cattle, Level II
ROPE PART DEFINITIONS

OVERHAND KNOT

SQUARE KNOT

1. 

2. 

3. 

4.
PRACTICAL FARM KNOTS
DAIRY CATTLE, LEVEL II
Member Handout 4, Knot Patterns continued

QUICK RELEASE KNOTS

1. 2. 3.

BOWLINE KNOT

1. 2. 3. 4.

DOUBLE HALF HITCH

HONDA KNOT

64–Dairy Cattle, Level II
Clipping Your Dairy Animal

What Members Will Learn . . .

ABOUT THE PROJECT:
- The technique used for clipping a dairy animal
- When to clip a dairy animal
- The importance of good clipping for showing an animal

ABOUT THEMSELVES:
- How grooming affects their personal appearance
- The importance of patience

Materials Needed:
- Pair of cow clippers
- Member Handout 5, Clipping for Show

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Dairy animals are clipped to improve their appearance in the show ring. A good job of clipping will make your animal appear to show with more style, balance and refinement.

Beginners should clip their animal at least six weeks before the show so there is still time to correct mistakes. The final clip job should be given one or two days before the show.

CLIPPING THE TAIL AND RUMP

It is advisable to start clipping on the tail of the animal, especially if she is not used to clippers. Start clipping about 4 inches above the switch. Avoid clipping too close to the switch as this can cause an unbalanced appearance. Clip against the hair on the tail until you reach the tail head. Then blend the longer hair and the close clipped area, by clipping with the hair, at the point where the tail lies between the pinbones. Blending should be done to remove the clipper marks as much as possible.

If the tail head is higher than you like, clip the hair short on top of the tail head, but clip with the hair. Do not clip all the hair off the tail head as this will draw attention to her tail head. Before leaving the tail head, blend with the hair along the sides of the tail head.

Clipping on the rump is confined to “touch up” work where only the high spots are clipped and long hair is left in the low spots. Always clip with

Leader Notes

Plan to use this lesson as a demonstration at a member’s home. Encourage the other members to bring their project animal for experience in clipping.

Pass out Member Handout 4, Clipping for Show.

Demonstrate how far above the switch to begin clipping.

Let each member practice clipping. Then, they can begin clipping their own animal.
Demonstrate how to clip from the point of the shoulder to the top of the withers without clipping too far back.

ACTIVITY

the hair when removing high spots from the rump. The idea is to make the rump look level and to blend the tail head so that it appears as a part of the rump area.

CLIPPING THE THIGHS AND HIND LEGS

Clipping long hair will make your dairy animal look cleaner and flatter in the thighs. The clippers may be run down the inside and outside of the thigh, with the hair, to remove any long hair. Also, if there is long hair on the hocks, clip with the hair to make the hocks appear cleaner and flatter.

CLIPPING THE FRONT END

A critical area for clipping is the shoulders. All of the hair from the shoulders forward should be clipped to give the dairy heifer or cow a refined appearance. The critical area for clipping is the shoulders. The most common mistakes made on clipping the shoulders is to clip too far back or not far enough back. It is a good idea to clip the shoulders at least six weeks before the show so that the hair has time to grow out and corrections can be made.

Start clipping at the point of the shoulder and clip along an imaginary line to the top of the withers. The clippers should come out just at the back side of the withers. The purpose is to clip the withers to improve the appearance of sharpness. Do not clip the hair from the top of the withers, but instead run the clippers with the hair on the top of the withers for blending. If the shoulders and withers are clipped too far back, the animal’s shoulders will look too sloping and the crops will be somewhat hollow. If the shoulders are not clipped far enough back, the animal’s neck will appear to be short. After the proper line has been clipped along the shoulder, blend the clipper line by clipping with the hair.

Clip all hair on the neck as close as possible unless the animal has a low area just in front of the withers. Leave the hair in this low spot to help smooth the juncture of the neck and withers. Use your free hand to stretch the skin on the neck to help minimize clipper marks.

All hair on the head and ears should be clipped short by clipping against the hair. This gives a clean, refined appearance to the head. If the animal is afraid of the clippers, cup the hand over the eyes when working around the head. Clip hair both inside and outside the ears.

CLIPPING OTHER AREAS

Normally, the underline of heifers should not be clipped. However, if there is long hair on their sides or underline, clip with the hair to smooth these areas.

Animals that have freshened will need additional clipping. Clip the udder as close as possible, then clip along the milk veins to make them more noticeable. Clip the belly area between the milk veins. Blend all clipper marks, using the natural body lines to help hide them. It is easier to clip a
full udder and you are less apt to cut the skin with the clippers when the udder is full.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. How did you feel about clipping your animal? What was the hardest to do? Easiest?

2. What clipping techniques are you going to have to practice doing a little more?

**Process:**
3. Why is clipping important in showing your calf?

4. What differences do you see in the animals that have been clipped and those who haven’t?

**Generalize:**
5. What are some techniques and practices you do to make yourself look better?

6. Are there some styles that look better for you than others? What are they?

7. Learning something new takes time and patience. What other things have you done that require time and patience?

**Apply:**
8. Make a list of all the ways you work to keep yourself under control and to hold your temper (i.e. count to 10, etc.).

**GOING FURTHER:**
- Attend a dairy show a day or two before the show and observe experienced people clipping their animals.
- Notice how attractive your animal appears after it has been clipped compared to the other unclipped animals on your farm.
REFERENCES:

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Reviewed by:
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68–Dairy Cattle, Level II
1. Begin clipping the tail about 4 inches above the long hairs of the switch.

2. Trim lower if necessary to have a well-blended switch.

3. Blend at the tailhead where the tail lies between the pinbone.

4. Accustom the animal to the noise of the clippers by resting them on her neck or shoulder.
5. Hold the clippers level with the topline to find the starting point for clipping hair from the top of the neck.

6. The point of the shoulder is usually the best place to begin clipping. From this area, make adjustments to assure the animal her best appearance.

7. Blend all clipper lines by clipping with the lay of the hair.

8. For a neater clipping job on the neck, pull the skin tight to help remove wrinkles.
9. Clip all hair on the head as short as possible. Dips and hair swirls necessitate clipping in many directions.

10. Cup your hand over the animal’s eye if she displays a fear of the clippers.

11. Clip hair from inside the ears. Use your free hand to brace the ear.

12. Clip hair from outside the ears. Use your free hand to brace the ear.
13. Clip hair from both inside and outside the ears. Use your free hand to brace the ear.

14. Clip the udder as close as possible.

15. Clip along the milk veins.

16. Clip the belly area between the milk veins.
Showing Your Dairy Animal

Dairy Cattle, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• The proper way to present their animal in the show ring
• The proper way to “set up” their animal
• The information they should know about their animal

ABOUT THEMSELVES:
• The importance of their appearance at significant occasions
• The value of being prepared
• Setting goals for self improvement

Materials Needed:
• A well-trained heifer or cow for demonstration
• A show halter
• Member Handout 6, Showing Techniques
• Member Handout 7, Scorecard for Fitting and Showmanship

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

A well trained and fitted animal will give your project the best chance of impressing the judge. The time spent fitting and training your dairy animal for showing will be well spent when show time arrives. This lesson will teach the techniques for showing your animal.

You should have your animal trained to lead well ahead of the show. During this time it is a good idea to start leading with a show halter to let your animal become accustomed to a halter with a chain lead. Make sure the halter fits properly so that the nose piece crosses the bridge of the nose approximately half-way between the nose and eyes. The lead strap should always come out on the left side of the halter so that you will be leading on the left side of your animal.

Animals always look their best with their heads held high and walking slowly, which causes them to take short steps. Long, plodding steps cause the rump to droop and the back to hump.

Be sure to have your animal trained to respond to the halter. When training your animal, lead with a hold on the halter close to the junction of the nose piece and the jaw. This will give you better control and it will be

Leader Notes

This lesson should be planned as a demonstration at a member’s farm. Encourage the other members to bring their animal to practice showing.
Pass out Member Handouts 6 and 7, Showing Techniques and Scorecard for Fitting and Showmanship. Have members discuss these handouts in small groups and share their experiences. Each small group could list questions to discuss with the total group. See if members can discover the answers by providing leading questions before sharing the rest of this lesson.

**ACTIVITY**

Pass out Member Handouts 6 and 7, Showing Techniques and Scorecard for Fitting and Showmanship. Have members discuss these handouts in small groups and share their experiences. Each small group could list questions to discuss with the total group. See if members can discover the answers by providing leading questions before sharing the rest of this lesson.

**Leader Notes**

It is easier to keep the animal’s head held high. Your animal must learn that a slight pressure on the halter means “stop,” and a gentle pull means “walk.”

You will need to spend some time training your animal to back. Being able to back your heifer is necessary when changing the position of the feet, or when changing position in a line. You should be able to back your animal by pushing backwards on the halter with the left hand and putting some pressure with your right hand at the point of the shoulder.

**SHOWING YOUR DAIRY ANIMAL**

When the time comes for your animal to be shown, be waiting at the ring side. It is important to be prompt for your class. Enter the ring leading from your animal’s left. Lead in a clockwise direction so that you will be toward the outside edge of the ring.

You may lead your animal walking forward with your right hand or walking backwards leading with your left hand. When the judge is observing your animal, it is a good idea to walk backwards and lead with your left hand so that you can more carefully observe the judge and your animal.

Lead your animal slowly with her head held high so that she takes short steps. If there are animals in the ring in front of you, leave about one-half of your animal’s length between your animal and the one in front; avoid leading too close or too far from the animal in front.

Pay close attention to your animal and the judge. However, do not get into a staring contest with the judge. You must be aware of the position of your animal and respond quickly to the judge’s requests.

Anytime you stop your animal, try to avoid stopping with her front feet in a low spot. In fact, it is preferred to stop with the front feet on a spot that is higher than the back feet since dairy animals look their best standing uphill.

Always set up your animal whenever you are stopped. If you are showing a heifer, you want her front feet placed side by side and squarely under the shoulders. Your heifer looks best with her hind leg on the side of the judge positioned under the pinbone with the other leg slightly forward.

Cows look their best if they are posed with their hind leg on the opposite side of the judge placed under the pinbone and the leg next to judge slightly forward. In this position, the hind leg next to the judge will be alongside the udder so that some of the fore udder and rear udder may be observed by the judge. If the judge moves to the other side of your animal, reverse the position of her feet by moving forward or backward a small step. All of the showing should be done from the halter so that you do not have to use your feet to position the feet of your animal.

Many times when the judge is observing your animal at close inspection, you will be asked for information about your animal. Always be prepared...
to answer such things as (1) date of birth, (2) stage of lactation, (3) freshening date, (4) date bred or date due to freshen, (5) service sire, (6) sire, and (7) dam.

When the judge asks for your animal to be lined up, be prompt. If you are first in line, try to find a high spot for your animal’s front feet. If you are to line up beside another animal, stop your animal even with the other animal. Do not leave enough space between your animal and the next for another animal to be pulled in between. Pose your animal and continue showing her.

When the judge passes in front of the line of animals, stand along the left side of your animal. Hold the halter with the right hand and face the judge so that the judge can observe the head and front end of your animal. If the judge is behind the line, reverse the procedures so that you can see the judge and your animal.

Remember to show your animal to the best of her advantage the entire time you are in the ring.

DIALOGUE FOR CRITICAL THINKING:

**Share:**
1. How did you feel about showing your animal or watching someone else show their animal?
2. What was the most difficult thing to do or learn?
3. What was the easiest thing to do?

**Process:**
4. Why is it important to learn showing techniques?
5. Why do you think it is important to know basic facts about your animal?
6. How much preparation and training will be needed to show a new animal?

**Generalize:**
7. What are some other activities that require extra preparation?

**Apply:**
8. What will you do to be better prepared for your next major event?
   Why?

**GOING FURTHER:**
- Attend a dairy show and observe how an experienced showman handles animals.
ACTIVITY

REFERENCES:

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76–Dairy Cattle, Level II
SHOWING YOUR DAIRY ANIMAL
DAIRY CATTLE, LEVEL II
Member Handout 6, Showing Techniques

1. The halter should fit properly and ride midway between the nose and eyes with the lead rope on the left side.

2. Train your animal to walk slowly with her head held high. Hold the lead rope closely for best control.

3. Proper pose for a heifer being judged from her right side.

4. Proper pose for a cow being judged from her right side. While training your animal, have someone else hold her while you stand back to examine her pose.
SHOWING YOUR DAIRY ANIMAL
DAIRY CATTLE, LEVEL II
Member Handout 6, Showing Techniques, continued

5. Applying pressure on the lead strap and shoulder point will make it easier to back the animal.

6. Accustom your animal to a leather show halter a week or two before the first show.

7. Walk backwards into the show ring, leading the animal with your left hand.

8. When the judge is at the front of the animal, allow a good view of her head and front end. Don’t change hands on the lead rope.
9. If the judge feels the animal’s hide, turn her head slightly toward the judge.
**SCORECARD**

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance of Animal</strong></td>
<td>40</td>
</tr>
<tr>
<td>Condition</td>
<td>10</td>
</tr>
<tr>
<td>Grooming</td>
<td>10</td>
</tr>
<tr>
<td>Clipping</td>
<td>10</td>
</tr>
<tr>
<td>Cleanliness</td>
<td>10</td>
</tr>
<tr>
<td><strong>Appearance of Exhibitor</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>Showing Animal in the Ring</strong></td>
<td>50</td>
</tr>
<tr>
<td>Leading</td>
<td>15</td>
</tr>
<tr>
<td>Posing</td>
<td>15</td>
</tr>
<tr>
<td>Show Animal to Best Advantage</td>
<td>10</td>
</tr>
<tr>
<td>Poise, Alertness, Attitude</td>
<td>10</td>
</tr>
</tbody>
</table>

**EXPLANATION OF SCORECARD**

**A. APPEARANCE OF ANIMAL**

1. Condition and thriftiness, showing normal growth, being neither too fat nor too thin. ...... 10
2. Grooming ........................................... 10
   a. Hair properly groomed and the hide soft and pliable. Hair dressing should not be used in excess.
   b. Hooves trimmed and shaped to enable animal to walk and stand naturally.
   c. Horns (if present) scraped and polished.
3. Clipping .................................................. 10
   a. The final clipping should be done about two days before the show.
   b. Head, ears, tail, udder, and elsewhere clipped as needed but not over entire body. Belly and udder not to be clipped on heifers that have not freshened and are not springing close.

**B. APPEARANCE OF EXHIBITOR**

1. Clothes and person, neat and clean, white clothing preferred.

**C. SHOWING ANIMAL IN THE RING**

1. Leading ............................................. 15
   a. Enter leading the animal at normal walk around the ring in a clockwise direction, walking opposite her head on the left side, holding the lead strap with the right hand quite close to the halter with the strap neatly, but naturally (not necessarily coiled) gathered in one or both hands. Holding close to the halter ensures a more secure control of an animal.
   b. Animal should lead readily and respond quickly.
   c. Halter of dairy type, fitting properly and correctly placed on animal. A leather halter is best.
   d. As the judge studies your animal, the preferred method of leading is walking slowly backward, facing the animal and holding the lead strap in the left hand. (Face forward when leading at all other times.)
SHOWING YOUR DAIRY ANIMAL
DAIRY CATTLE, LEVEL II
Member Handout 7, Scorecard for Fitting and Showmanship, continued

e. Lead slowly with animal’s head held high enough for the animal to present an impressive style, attractive carriage and graceful walk.

2. Posing............................................................... 15
   a. When posing and showing an animal stay on the animal’s left side and stand faced at an angle to her in a position far enough away to see stance of her feet and her topline.
   b. Pose animal with feet placed squarely under her with the hind leg nearest to the judge slightly behind the other one. (When posing cows in milk, the hind leg nearest to the judge should be slightly ahead of the other one.)
   c. Face animal uphill, if possible, with her front feet on a slight incline.
   d. Neither crowd the exhibitor next to you nor leave enough space for another animal when you lead into a side-by-side position.
   e. Animal may be backed out of line when judge requests that her placing be changed. Many prefer to lead animal forward and around the end of the line or back through the line. Do not lead animal between the judge and an animal being observed.
   f. Do most of the showing with the halter lead strap and avoid stepping on animal’s hind feet to move them.
   g. Step animal ahead by a slight pull on the lead strap.
   h. Move animal back by exerting pressure on the shoulder point with the thumb and fingers of the right hand as you push back with the halter.
   i. When judge is observing the animal, let her stand when posed reasonably well.
   j. Be natural. Overshowing, undue fussing and maneuvering is objectionable.

3. Show to Best Advantage.................................. 10
   a. Quickly recognize the conformation faults of the animal you are leading and show her to overcome them. You may be asked to exchange with another and show her or his animal for awhile.

4. Poise, Alertness and Attitude........................... 10
   a. Keep an eye on your animal and be aware of the position of the judge at all times. Do not be distracted by persons and things outside the ring.
   b. Show animal at all times and not yourself.
   c. Respond rapidly to requests from the judge and officials.
   d. Be courteous and sportsmanlike at all times.
   e. Keep showing until the entire class has been placed and the judge has given the reasons.
Dairy Animal’s Lifetime History

Dairy Cattle, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of keeping accurate records
• How to keep a lifetime history

ABOUT THEMSELVES:
• The importance of good record keeping
• How their lives have been recorded by various records
• Their lives are more than just the records that are kept

Materials Needed:
• Activity Sheet 4, Dairy Animal Lifetime History
• Member Handout 8, Example Dairy Animal Lifetime History

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Every dairy heifer should have a record of her lifetime called a “lifetime history.” A lifetime history is important for recording facts about an animal that otherwise might not be remembered. This history should begin very early in life so that important information will not go unre- corded. The lifetime history should include the following information:

1. Name.
2. Birth date.
3. Identification number.
4. Sire’s name and identification number.
5. Dam’s name and identification number.
6. Permanent identification (sketch or tattoo).
7. Vaccination record.
8. Purchase and sales record.
10. Reproductive problems.
11. Health disorders (scours, respiratory diseases, mastitis, etc.).
12. Production records.

Leader Notes

Pass out Member Handout 8, Example Dairy Animal Lifetime History. Review the information that has been recorded and ask the members where this information may be obtained.

Pass out Activity Sheet 4, Dairy Animal Lifetime History, to be used by the members with their own animal. Have members make copies or start a record for each heifer.
Leader Notes | ACTIVITY

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What records do you think will be the hardest to keep? The easiest?
2. What are the major differences between a heifer and a cow history?

**Process**
3. Why is it important to keep this much information on each animal?
4. Would you want to buy a cow without complete records? Why or why not?

**Generalize:**
5. What similarities are there between dairy cow records and those kept on other animals?
6. If you looked back over your school, health, immunization and birth information, what can you learn?
7. What are things about yourself that are more difficult to record?

**Apply:**
8. How can you take the concepts of neat and careful record keeping and use it in other areas of your life?

**GOING FURTHER:**
- Visit a dairy and review the lifetime records of the animals.
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 Programs, Kansas State University

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83–Dairy Cattle, Level II
DAIRY ANIMAL’S LIFETIME HISTORY

DAIRY CATTLE, LEVEL II

Member Handout 8, Example Dairy Animal Lifetime History

Name: ____________________________ ID No. ____________ Birth Date____________
Sire: ______________________________ ID No. ____________
Dam: ______________________________ ID No. ____________

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

TATTOO NO. ________________________

VACCINATION RECORD

<table>
<thead>
<tr>
<th>DATE</th>
<th>VACCINE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-10-93</td>
<td>IBR-PI3, BVD: Blackleg</td>
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<td>6-02-93</td>
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<td>H. Somnus</td>
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<td>7-30-93</td>
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<td>2-10-94</td>
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<td>IBR-PI3</td>
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<tr>
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<td>2-1-96</td>
<td>IBR-PI3, BVD,   Lepto, E. Coli</td>
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</tr>
<tr>
<td>1-10-97</td>
<td>IBR-PI3, BVD,   Lepto, E. Coli</td>
<td></td>
</tr>
<tr>
<td>4-10-98</td>
<td>IBR-PI3, BVD, Lepto, E. Coli</td>
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</table>

PURCHASE AND SALE RECORD

Purchased from: ____________________________ Date: 3-23-93 Price: $300.00
Date left herd: _____________ Reason __________________________________________
Sold to: ____________________________ Price: ____________

Sketch markings or attach picture.
Name: Molly

### BREEDING AND CALVING RECORD

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<th>Heat Dates</th>
<th>1st Service</th>
<th>2nd Service</th>
<th>3rd Service</th>
<th>4th Service</th>
<th>5th Service</th>
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<th>Sex of Calf</th>
<th>Identification or Disposal</th>
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### REPRODUCTIVE PROBLEMS

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<th>Condition</th>
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</thead>
<tbody>
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<td>4-21-96</td>
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<td>5-15-96</td>
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### PRODUCTION RECORDS

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<thead>
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<th>Fresh Date</th>
<th>Age Yrs–Mo.</th>
<th>305 Days or Less Record</th>
<th>Diff from Herdmates</th>
<th>Completed Record</th>
<th>Lifetime Total</th>
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<tbody>
<tr>
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<td>Fat % Prot</td>
<td>Prot</td>
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DAIRY ANIMAL’S LIFETIME HISTORY
DAIRY CATTLE, LEVEL II
Activity Sheet 4, Dairy Animal Lifetime History

Name: ____________________________ ID No. ____________ Birth Date ______________
Sire: ______________________________ ID No. ____________
Dam: _____________________________ ID No. ____________

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

TATTOO NO. ______________________

VACCINATION RECORD

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</table>
Learning About Dairy Products
*Dairy Cattle, Level, II*

What Members Will Learn . . .

ABOUT THE PROJECT:
• The kinds of dairy products available
• The nutrients provided by dairy products

ABOUT THEMSELVES:
• The importance of dairy products in their diet
• The importance of decision making

Materials Needed:
• Activity Sheet 5, Dairy Products Puzzle
• Leader’s Key, Activity Sheet 5, Dairy Products Puzzle
• Activity Sheet 6, Dairy Products Word Search
• Leader’s Key, Activity Sheet 6, Dairy Products Word Search

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY

Milk has long been called “natures most nearly perfect food.” There is a good reason for this label since milk contains so many of the essential nutrients for life. Milk is the food for the newborn of all mammals. This in itself indicates that milk is a very nutritious product.

Milk is also the source of many products—everything from ice cream for dessert to the cheese on our cheeseburgers.

Fortunately, most dairy products are a good source of the nutrients we require in our diets every day. These include: protein, carbohydrates, vitamins, minerals, fat and water.

Protein is the nutrient needed for growth and building muscle.

Carbohydrates are needed as a source of energy. The carbohydrate in milk is lactose.

Vitamins are nutrients that are needed in very small amounts for certain functions.

• Vitamin A helps prevent night blindness and helps keep skin and mucous membranes healthy.
Divide members into small groups. Give each group two or three of the milk product names to see if they can write a definition or explain what it is. Have them share the definition or description with the entire group to see if they can guess the term.

• Thiamine is a vitamin that is needed for a normal appetite and digestion. It also helps change substances in food into energy.
• Riboflavin, another essential vitamin, helps the cells of the body use oxygen needed for growth.
• Vitamin D, helps in the absorption of calcium to build strong bones. Milk does not naturally contain vitamin D, but is added to milk by the processor.

Minerals are nutrients needed for building strong bones and teeth and for other body functions.

• Calcium is needed for building strong bones and teeth. Milk and milk products supply most of the calcium in our diet.
• Phosphorus is needed for building strong bones and teeth in combination with calcium. It also is required for converting food nutrients into energy. Milk and milk products are good sources of phosphorus.
• Fat from milk is called milk fat or butterfat. It is a concentrated source of energy and provides essential fatty acids. Many adults drink skim milk which has had the milk fat removed to reduce the amount of calories they consume. However, growing boys and girls usually need the energy furnished by milk fat. The milk fat in cream is churned to make butter.
• Water is necessary for all living things. Milk is 87 percent water.

The following are some of the milk products we should include in our diet.

• Whole milk provides all of the important nutrients mentioned above.
• Skim milk has had the milk fat removed so that it contains fewer calories than whole milk, but it is an excellent source of protein, vitamins and minerals.
• Chocolate milk is skim milk that has had chocolate added for flavoring. It would be similar in nutrient content to skim milk.
• Nonfat dry milk is skim milk that has been dried so that it can be stored without refrigeration. Nonfat dry milk is used in many food items such as breads and pastries.
• Cheese is made from milk and, therefore, is an excellent source of protein and minerals. There are many varieties of cheese, and they are excellent sources of nutrients.
• Cottage cheese is another cheese product. It is made from skim milk and cream is added to the finished product as a dressing. Cottage cheese is a nutritious dairy food that can be included with almost any meal.
• Sour cream is a cultured product made from cream by adding lactic acid-producing bacteria which causes the cream to become firm. It is high in energy value, but is not an important source of protein or minerals. It is used in dips and toppings.
• Butter milk is another cultured product that is made from skim milk.
• Yogurt is a cultured dairy product that is made from skim milk to which nonfat dry milk has been added. It, therefore, is an excellent...
source of protein and minerals. Yogurt is a flavorful dessert that can be made with many different flavors.

- **Butter** is not an important source of nutrients. It is a concentrated source of energy since it is made by churning the milk fat in cream into butter.

- **Ice cream** is a nutritious dairy product that is made from milk, cream, eggs and sugar. It is a good source of protein and minerals, but it does contain calories due to its content of milk fat and added sugar. The number of flavors of ice cream is almost limitless.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What nutrient in milk was easiest to identify?
2. What is your favorite milk product? Least favorite? Why?

**Process:**
3. Why are milk products important in your diet?
4. What milk nutrient is needed less by adults than kids?
5. What new milk products did you learn about?

**Generalize:**
6. What other decisions do you make each day?
7. How did you go about making your decision?

**Apply:**
8. Role play some decision making situations
   (a) How to spend $10.
   (b) What library book to check out.
   (c) Pick your own situation.

**GOING FURTHER:**
- Visit a supermarket and look at all of the products made from milk in the dairy case.
- Have a milk product tasting fair to let members try new products.
ACTIVITY

REFERENCES:

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

Reviewed by:
Harold A. Roberts, Extension Specialist, Dairy Technology, Kansas State University
Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
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LEARNING ABOUT DAIRY PRODUCTS
DAIRY CATTLE, LEVEL II
Activity Sheet 5, Dairy Products Puzzle

See if you can fill in the spaces with the names of the following dairy products.

Butter

Cheddar Cheese

Chocolate Milk

Cottage Cheese

Milk

Ice Cream

Skim Milk

Swiss Cheese
LEARNING ABOUT DAIRY PRODUCTS
DAIRY CATTLE, LEVEL II
Leader’s Key, Activity Sheet 5, Dairy Products Puzzle

See if you can fill in the spaces with the names of the following dairy products.

Butter

Cheddar Cheese

Chocolate Milk

Cottage Cheese

Milk

Ice Cream

Skim Milk

Swiss Cheese
LEARNING ABOUT DAIRY PRODUCTS
DAIRY CATTLE, LEVEL II
Activity Sheet 6, Dairy Products Word Search

Circle the dairy products found in this puzzle. Some are spelled forwards, backwards, diagonally, from top to bottom, and from bottom to top.

BUTTER
BUTTER MILK
CHEDDAR CHEESE
CHOCOLATE MILK
COTTAGE CHEESE
CREAM
EGGNOG

ICE CREAM
MILK
NONFAT DRY MILK
SKIM MILK
SOUR CREAM
SWISS CHEESE
YOGURT

B Y C H O C O L A T E M I L K
U W O V U T R S R Q P O C N L
T R T T T U B E L K J I E H I
T H T G B F E D A T M B C T M
E A A Z Y U X W R M I U R S M
R R G Q P O T U N M L K E J I
I I E H G F G T E D K B A A K
N Z C Y X O W V E U T S M R S
O A H Q Y P O N M R L K J I H
J Z E G G N O G T F M E D C B
U Y E E S E E H C S S I W S X
C W S O U R C R E A M V L U T
D S E R Q P O N M L K J I K H
A Y C H E D D A R C H E E S E
K L I M Y R D T A F N O N G F
Circle the dairy products found in this puzzle. Some are spelled forwards, backwards, diagonally, from top to bottom, and from bottom to top.

BUTTER
BUTTER MILK
CHEDDAR CHEESE
CHOCOLATE MILK
COTTAGE CHEESE
CREAM
EGGNOG

ICE CREAM
MILK
NONFAT DRY MILK
SKIM MILK
SOUR CREAM
SWISS CHEESE
YOGURT
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
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.
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.
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 2: ____________________________
   - Barrier 3: ____________________________
   - Barrier 4: ____________________________
   - Barrier 5: ____________________________

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 2: ____________________________
   - Strategy 3: ____________________________
   - Strategy 4: ____________________________
   - Strategy 5: ____________________________

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.
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. 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...”
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.”

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:

“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.

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.”
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.
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.

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?

Process:
3. What are you gong 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?

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

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12–Dairy Cattle, Level III
## INTRODUCTION TO GIVING ORAL REASONS
### DAIRY CATTLE, LEVEL III
Member Handout 1, Reasons Terminology for Dairy Cattle

### GENERAL APPEARANCE

<table>
<thead>
<tr>
<th>Desirable</th>
<th>Undesirable (Criticisms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. More symmetry, style and balance</td>
<td>1. Less of symmetry, style, and balance</td>
</tr>
<tr>
<td>2. Smoother and parts well blended</td>
<td>2. Rougher and parts not as well blended</td>
</tr>
<tr>
<td>3. Smoother and tighter in the shoulders</td>
<td>3. Rougher or more open in the shoulders</td>
</tr>
<tr>
<td>4. Stronger in the chine</td>
<td>4. Weaker in the chine</td>
</tr>
<tr>
<td>5. Stronger in the loin</td>
<td>5. Weaker in the loin</td>
</tr>
<tr>
<td>6. Stronger in the back or top line</td>
<td>6. Weaker in the back or top line</td>
</tr>
<tr>
<td>7. Nearly level from hips or hooks to pins</td>
<td>7. Too slopping from hips or hooks to pins: pins higher than hips or hooks</td>
</tr>
<tr>
<td>8. Longer and wider in the rump</td>
<td>8. Shorter and narrower in the rump</td>
</tr>
<tr>
<td>9. Higher and wider in the thurls</td>
<td>9. Lower and narrower in the thurls</td>
</tr>
<tr>
<td>10. More correct set to the hocks</td>
<td>10. Too much set or too straight in the hocks</td>
</tr>
<tr>
<td>11. More width between the hocks</td>
<td>11. Too close between the hocks</td>
</tr>
<tr>
<td>12. Stronger, shorter pasterns</td>
<td>12. Longer or weaker pasterns</td>
</tr>
<tr>
<td>13. Deeper in the heels</td>
<td>13. Shallower in the heels</td>
</tr>
<tr>
<td>14. Front legs and feet parallel with the body</td>
<td>14. Toes out</td>
</tr>
</tbody>
</table>

### DAIRY CHARACTER

<table>
<thead>
<tr>
<th>Desirable</th>
<th>Undesirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. More angularity</td>
<td>1. Less angularity</td>
</tr>
<tr>
<td>2. More length, stretch and openness</td>
<td>2. Less length, stretch and openness</td>
</tr>
<tr>
<td>3. Cleaner and free of excess fleshing</td>
<td>3. Coarser, thicker, stale, or over conditioned</td>
</tr>
<tr>
<td>4. Feminity about the head</td>
<td>4. Coarse and lacking feminity about the head</td>
</tr>
<tr>
<td>5. Cleaner in the throat</td>
<td>5. Thicker in the throat</td>
</tr>
<tr>
<td>6. Longer and leaner in the neck</td>
<td>6. Shorter and thick in the neck</td>
</tr>
<tr>
<td>7. Cleaner and more refined in the brisket</td>
<td>7. Thicker and coarser in the brisket</td>
</tr>
<tr>
<td>8. Cleaner and more refined in the withers</td>
<td>8. Thicker and coarser in the withers</td>
</tr>
<tr>
<td>9. Cleaner over the hips and pins</td>
<td>9. Thicker over the hips and pins</td>
</tr>
<tr>
<td>10. Cleaner, flatter thighs</td>
<td>10. Thicker in the thighs</td>
</tr>
<tr>
<td>11. Cleaner, flatter bones</td>
<td>11. Coarser bones</td>
</tr>
</tbody>
</table>
INTRODUCTION TO GIVING ORAL REASONS
DAIRY CATTLE, LEVEL III
Member Handout 1, Reasons Terminology for Dairy Cattle, continued

BODY CAPACITY

<table>
<thead>
<tr>
<th>Desirable</th>
<th>Undesirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deeper in the chest</td>
<td>1. Shallower in the chest</td>
</tr>
<tr>
<td>2. Wider on the floor of the chest</td>
<td>2. Narrower on the floor of the chest</td>
</tr>
<tr>
<td>3. Fuller in the crops</td>
<td>3. Weaker in the crops</td>
</tr>
<tr>
<td>4. Deeper in the barrel or rear ribs</td>
<td>4. Shallower in the barrel or rear ribs</td>
</tr>
<tr>
<td>5. More spring of rib</td>
<td>5. Less spring of rib</td>
</tr>
<tr>
<td>6. Deeper in the flank</td>
<td>6. Shallower in the flank</td>
</tr>
<tr>
<td>7. More width through the rump</td>
<td>7. Narrower through the rump</td>
</tr>
</tbody>
</table>

MAMMARY SYSTEM

<table>
<thead>
<tr>
<th>Desirable</th>
<th>Undesirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Symmetry and balance</td>
<td>1. Unbalanced</td>
</tr>
<tr>
<td>2. Leveler on the floor</td>
<td>2. Slopping on the floor</td>
</tr>
<tr>
<td>3. Strongly and smoothly attached fore udder</td>
<td>3. Weaker or bulging fore udder attachment</td>
</tr>
<tr>
<td>4. Strong median suspensory ligament</td>
<td>4. Weaker median suspensory ligament</td>
</tr>
<tr>
<td>5. Higher, wider rear udder attachment</td>
<td>5. Lower, narrower rear udder attachment</td>
</tr>
<tr>
<td>6. More capacity of the mammary system</td>
<td>6. Less capacity of the mammary system</td>
</tr>
<tr>
<td>7. More desirable length of teat</td>
<td>7. Teats too long</td>
</tr>
<tr>
<td>8. More desirable teat placement</td>
<td>8. Front teats too wide</td>
</tr>
</tbody>
</table>

TRANSITION WORDS FOR ORAL REASONS

Furthermore                        Moving to
Even so                            Therefore
Nevertheless                       Admit
However                            Grant
And                                Realize
KANSAS 4–H

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

| Class Name _______________________________ |
| Placing _________________________________ |

<table>
<thead>
<tr>
<th>Compare</th>
<th>Grant</th>
<th>Criticize</th>
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15–Dairy Cattle, Level III
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

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.

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:

---

*17–Dairy Cattle, Level III*
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? \(4 \times 4 \times 3.14 \times 2 \times 7.46 = \text{about} \ 749.6\text{ gallons}\) 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?
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 forumlas 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:

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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:
\[ \text{width} \times \text{depth} \times \text{length} \times 3.73 = \text{gallons} \]
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.
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 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
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.

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 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.

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.

**DIALOGUE FOR CRITICAL THINKING:**
**Share:**
1. What are the six nutrients?
2. What nutrients were you the least familiar with?

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.
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:
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

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 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.
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 mids and animal fat.

1. Wheat mids is produced in the milling of wheat into flour. Mids 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.
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.
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?
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:

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33—Dairy Cattle, Level III
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 _________________________ EUSMGEEL ________________

3. Silage:
   NROC ___________________________ LFAFALA _________________
   MHGUROS _______________________

34–Dairy Cattle, Level III
FEED IDENTIFICATION AND CLASSIFICATION
DAIRY CATTLE, LEVEL III
Leader’s Key, Activity Sheet 3, Feed Classification Word Scramble

CONCENTRATES

1. Grains:
   EAYLRB ________ Barley
   ROCN ________ Corn
   TSOA ________ Oats
   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
   DETOCONTES ALME ________ Cottonseed Meal
   DESNILE LEAM ________ Linseed 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
   EUSMGE1 ________ 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**

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.

**Leader Notes**

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
What are the five major functions the digestive system performs:

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

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.

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

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.

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

**Alimentary Canal**

**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.
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 many-plies. 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

**ACTIVITY**

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?
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?

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

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

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

RUMINANT DIGESTIVE TRACT
(Alimentary Canal)

MONOGASTRIC DIGESTIVE TRACT
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

KANSAS 4-H

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

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.
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$_{2}$O$_{5}$) and 40 pounds of potassium (K$_{2}$O) 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.
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

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48–Dairy Cattle, Level III
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.
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.

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<th>Crop</th>
<th>Stage of Growth</th>
<th>Crude Protein %</th>
<th>Estimated Crude Protein %</th>
<th>Actual Crude Protein %</th>
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<td></td>
<td>Full Bloom</td>
<td>14.0</td>
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<td></td>
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<td>Wheat</td>
<td>Boot</td>
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<td>Full Bloom</td>
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<td>Other Forages You Collected:</td>
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50–Dairy Cattle, Level III
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
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.

Leader Notes
Have members take samples from blocks of hay. Call their attention to how easily leaves break off unless handled gently.
TAKING A HAY SAMPLE

**Leader Notes**

**ACTIVITY**

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 stemmer than the rest of the hay, which results in non-representative samples. Since a stemmer sample results, the results of the analysis will be lower than the rest of the bale of the hay.

Have a forage sampler available and allow members to take samples.

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.

Show bale probe.

Begin procedure.

Demonstrate each of the steps slowly.

Allow members to core bales and prepare samples.

Sample 8 to 10 bales of the hay per lot to be tested, using a forage probe.

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.

Continue coring each of the remaining bales and dumping the probe cuttings into the bucket. Mix the subsamples well by stirring with your hand.

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.

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.

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.
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:

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54–Dairy Cattle, Level III
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.
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, course, 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

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.

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.

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:
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.

<table>
<thead>
<tr>
<th>Quality Rating</th>
<th>Ribbon Color</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Blue</td>
<td>85 points or more</td>
</tr>
<tr>
<td>Good</td>
<td>Red</td>
<td>70–84 points</td>
</tr>
<tr>
<td>Fair</td>
<td>White</td>
<td>50–69 points</td>
</tr>
<tr>
<td>Poor</td>
<td>None</td>
<td>Below 50 points</td>
</tr>
</tbody>
</table>

**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

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:

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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

_______     _______     _______     _______
## Activity Sheet 7, Hay Judging Contest Grading Card

**Contestant's Name**

<table>
<thead>
<tr>
<th>SAMPLE No.</th>
<th>MATURITY</th>
<th>TEXTURE</th>
<th>LEAFINESS</th>
<th>FOREIGN MATTER</th>
<th>COLOR</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preboot or Pre-</td>
<td>Pliable</td>
<td>Un-Pliable</td>
<td>Stemmy Bloom</td>
<td>Clean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>Medium</td>
<td>Leafy Bloom</td>
<td>Shattered Bloom</td>
<td>Weeds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boot or 1/10</td>
<td>Moderately</td>
<td>Un-Pliable</td>
<td>Weeds</td>
<td>Subtle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full</td>
<td>Pliable</td>
<td>Leafy Bloom</td>
<td>Subtle</td>
<td>Mold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large</td>
<td>Medium</td>
<td>Un-Pliable</td>
<td>Mold</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leafy Bloom</td>
<td>Other</td>
<td>Bright</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Un-Pliable</td>
<td>Bright</td>
<td>Bleached</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leafy Bloom</td>
<td>Non-Uniform</td>
<td>Dark</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Un-Pliable</td>
<td>Non-Uniform</td>
<td>Non-Uniform</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leafy Bloom</td>
<td>Non-Uniform</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Scoring**

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Texture</th>
<th>Leafiness</th>
<th>Foreign Matter</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Legume</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

**Preboot or Pre-**

- **Boot or 1/10**
- **Full or Large**

**Pliable or Un-Pliable**

- **Medium**
- **Leafy Bloom**
- **Un-Pliable**
- **Leafy Bloom**

**Stemmy Bloom**

- **Clean**
- **Weeds**
- **Subtle**
- **Mold**
- **Other**
- **Bright**
- **Bleached**
- **Dark**
- **Non-Uniform**
Both physical and chemical factors are considered in classifying all hay entries.

### A. Physical Scorecard

<table>
<thead>
<tr>
<th>Factor</th>
<th>Grass Hay</th>
<th>Legume Hay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturity</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Texture: size of stem and pliability</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Leafiness</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>Freedom from foreign material</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Color</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Total possible physical score: 100

### B. Chemical (Crude Protein) Scorecard

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

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

<table>
<thead>
<tr>
<th>Final Score</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 or above</td>
<td>Excellent</td>
</tr>
<tr>
<td>70 to 84</td>
<td>Good</td>
</tr>
<tr>
<td>50 to 69</td>
<td>Fair</td>
</tr>
<tr>
<td>Below 50</td>
<td>Poor</td>
</tr>
</tbody>
</table>
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

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.

63–Dairy Cattle, Level III
THE COMFORT ZONE: KNOWING YOUR ANIMAL’S NORMAL TEMPERATURE

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.

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)

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?
THE COMFORT ZONE: KNOWING YOUR ANIMAL’S NORMAL TEMPERATURE

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.
### The Comfort Zone: Knowing Your Animal's Normal Temperature

**Dairy Cattle, Level III**

**Member Handout 8, Animal Vital Signs**

<table>
<thead>
<tr>
<th>Animal</th>
<th>Rectal Temperature °F</th>
<th>Respiration Rate (per minute)</th>
<th>Heart Rate (per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>98.6</td>
<td>16 (14-20)</td>
<td>70 (60-100)</td>
</tr>
<tr>
<td>Cattle</td>
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<td>50 (40-70)</td>
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<td>75 (60-120)</td>
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<td>12 (8-16)</td>
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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 overemphasized. 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
### 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?
WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES

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

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72-Dairy Cattle, Level III
WHERE DOES IT HURT? INTRODUCTION TO COMMON CATTLE DISEASES
DAIRY CATTLE, LEVEL III
Member Handout 9, Cow’s Respiratory System
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

<table>
<thead>
<tr>
<th>Name</th>
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<tr>
<td>IBR</td>
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<td>Virus</td>
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<tr>
<td>PI-3</td>
<td>Respiratory System</td>
<td>Virus</td>
</tr>
<tr>
<td>BRSV</td>
<td>Respiratory System</td>
<td>Virus</td>
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<tr>
<td>Pasteurellosis</td>
<td>Respiratory System</td>
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<td>Haemophilus</td>
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<td>BVD</td>
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<td>Coccidiosis</td>
<td>Intestinal System</td>
<td>Protozoa</td>
</tr>
<tr>
<td>Pinkeye</td>
<td>Eyes</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Blackleg</td>
<td>Muscle</td>
<td>Bacteria</td>
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<tr>
<td>Malignant edema</td>
<td>Muscle</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Urinary System</td>
<td>Bacteria</td>
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</table>
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

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

Leader Notes

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).
COMMON CATTLE DISEASES: FOOT ROT

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.
REFERENCES:
Kansas Beef Cattle Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas

Authors:
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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 bloodstream 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.
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

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:

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

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

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.
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 prepping 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.
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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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**

**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?

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.
ACTIVITY

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:


Author:
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93–Dairy Cattle, Level III
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
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.
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 ear-tagged 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.

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

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**ACTIVITY**

**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.

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.

**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**

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

Review using Activity Sheet 9, Dairy Cattle Identification Summary. Remind members to place this sheet plus the other handouts in their record books.
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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98–Dairy Cattle, Level III
Summarize the advantages and disadvantages of each of the following methods of identifying cattle.

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<th>Advantages</th>
<th>Method</th>
<th>Disadvantages</th>
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<td>Paint Brand</td>
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## Application for a Verified Identification (VIP 2)

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<td>(40) Supervisor’s Last Name (Print)</td>
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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.

Owner ____________________________

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.

Supervisor ________________________

Date ____________________________

For office use:

Owner’s Signature ____________________________

Supervisor’s Signature ____________________________

Date ____________________________
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—freeze brand. 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—Guerney
   - 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 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 Grand sire 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 Grand sire 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 Grand sire 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—Qualifications
   - California 4—Michigan 7—N. Carolina 12—Wisconsin
   - Iowa 5—Minnesota 9—Pennsylvania
   - New York 10—Utah

34, 35, 36. Twin or polled—If the animal is a twin or 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 3½ 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.
Application for a Verified Identification (VIP 2) 12-83

(Please use pencil or black ink)

Date of Application

For office use:

10 – 1 – 97
Mo. Day Year

43 WFE 43 11
(Temporary Number(s) (Tattoo or Freeze Brand Only)

F L – 49 01 24 97
(2) Sex (3) Barn Name or No. (4) Mo. (5) Breed

Holstein

B & W

(6) Solid (7) Coat Color

1001

(8) Computer Control No.

(9) Eartag Number

Sire

RuAnn Knight Lucky

(10) Eartag Number

H

(11) Sex

(12) Breed

H

(13) Sire No.

15 1 5 2 0 7

(14) Dam Name

D – 139

(15) Breed

H

(16) Dam No.

43 WDF 6 9 7 5

(17) Maternal Grand sire

Paclamar Bootmaker

(18) Breed

H

(19) MGS No.

14 5 0 2 2 8

(20) Mo. Day Year

Date dam was bred

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

(25) Owner’s Name (Print)

(26) Address (Print)

(27) City (Print)

(28) State

(29) Zip

(30) Owner’s Herdcode

(31) Association

(32) Proc. Center

Twin (x), Twin with bull, Twin with polled (hornless)

Embryo Trans (E)

(33) (34) (35) (36)

For office use:

(37) Owner’s Signature

(38) Supervisor’s Signature

(39) Color Markings

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.

__________________________

Owner

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.

__________________________

Supervisor

(30) Owner’s Last Name (Print)

43 00 26

(40) Supervisor’s Last Name (Print)

Final sketches and signatures must be in ink.
DAIRY CATTLE IDENTIFICATION
DAIRY CATTLE, LEVEL III
Member Handout 16, Sample Verified Identification Certificate, continued

[Image of a sample verified identification certificate for a Holstein female cow with details filled in including the owner's information, verification numbers, and signatures.

---

Richard [Signature]
Executive Secretary
National Dairy Herd Improvement Association
4 Kildee Hall
Ames, Iowa 50011

DATE: 1-29-76

I certify the parentage and permanent identification of this animal as shown herein in accordance with the rules of the National Dairy Herd Improvement Association.
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)
### DHIA-205 LIFETIME HISTORY OF INDIVIDUAL COW

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

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Identification Numbers</th>
<th>Barn Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cow Name</th>
<th>Reg. No.</th>
<th>Tattoo No.</th>
<th>Ear-tag</th>
<th>Birth Date</th>
<th>Breed</th>
<th>Dam</th>
<th>Dam’s Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Place printed identification label here

Sketch markings or attach picture

#### Heifer Record

(List all treatments and conditions prior to first freshening of this heifer.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Condition</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Type and Management Traits

(Complete this section after heifer has freshened and information is available.)

<table>
<thead>
<tr>
<th>Milking Speed</th>
<th>Fast</th>
<th>Average</th>
<th>Slow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposition</td>
<td>Quiet</td>
<td>Nervous</td>
<td>Ornery</td>
</tr>
<tr>
<td>Ketosis, Milk Fever</td>
<td>None</td>
<td>Light</td>
<td>Severe</td>
</tr>
<tr>
<td>Mastitis</td>
<td>None</td>
<td>Some</td>
<td>Chronic</td>
</tr>
<tr>
<td>Udder Edema</td>
<td>Light</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
</tbody>
</table>

| Date | FS | GA | DC | B | M | St | Hd | FE | Bk | Rp | HL | Ft | FU | RU | US | Qy | Tt | Mc |
|------|----|----|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|

### Purchased from

Purchased from_________________________________________ Date__________________ Price_________________

### Sold to

Sold to_________________________________________ Date__________________ Price_________________

### Classification

105–Dairy Cattle, Level III
### Breeding and Calving Record

<table>
<thead>
<tr>
<th>Date Calved</th>
<th>Heat Dates</th>
<th>1st Service</th>
<th>2nd Service</th>
<th>3rd Service</th>
<th>4th Service</th>
<th>Sire used</th>
<th>Confirmed Pregnant</th>
<th>Date Calved</th>
<th>Sex of Calf</th>
<th>Ear Tag No. or Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(heifer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Reproductive Problems

<table>
<thead>
<tr>
<th>Date</th>
<th>Condition</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Mastitis and Other Problems

<table>
<thead>
<tr>
<th>Date</th>
<th>Condition</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

### Index

<table>
<thead>
<tr>
<th>Name</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>
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.
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 data...
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.

**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

INTRODUCTION TO PRODUCTION RECORDS—DHIA

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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110–Dairy Cattle, Level III
Kansas 4-H Dairy Cattle Leader Notebook

Level IV

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Advancing by Setting Long-Term Goals

*Dairy Cattle, Level IV*

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- Setting goals

**ABOUT THEMSELVES:**
- The importance of setting goals

**Materials Needed:**
- Dairy Member Guide and Annual Report (MG-38)
- Activity Sheet 1, Preparing Long-Term Goals

**ACTIVITY TIME NEEDED:** 60 MINUTES

**ACTIVITY**

Because of your involvement and achievements in past dairy projects, you will now be helping other project members by sharing the information and knowledge that you’ve gained about dairy science.

As a junior leader, you also will be reviewing your own goals.

Your progress throughout Level IV is an important part of your project. Sometimes, setting long-term goals is difficult and, therefore, we don’t do it. But in Level IV, we have made several places for you to look at your progress.

Setting long-term goals does not need to be intense or elaborate. Rather, it should be simple and to the point. If you take time to review your long-term goals, you will have a better chance of reaching those goals.

Goals can be long-term or short-term. When using the Dairy Member Guide and Annual Report for Level IV, let’s make both goals long-term—something you plan to do in two to five years.

Many of the things you have been learning in your dairy project are skills that are transferable to long-term goals, such as obtaining more education, getting a job, winning a scholarship, or even pursuing a career.

Now that you’ve completed the activity sheet, let’s fill out the Dairy Member Guide and Annual Report using these two long-term goals.

**Leader Notes**

Remind members that:
1. Long-term goals may require a series of short-term goals.
2. Goal setting is a continuous process throughout life.

Pass out Activity Sheet 1, Preparing Long-Term Goals, and fill in the blanks.

Complete MAP STEPS one to seven.
ADVANCING BY SETTING LONG-TERM GOALS

Leader Notes

<table>
<thead>
<tr>
<th>ACTIVITY</th>
</tr>
</thead>
</table>

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What are your two goals?
2. What did you like most about this activity?

Process:
3. Why is it important to review your long-term goals?
4. What skills can you use in other projects, activities or situations?

Generalize:
5. What did you learn about yourself from this activity?

Apply:
6. How will you apply what you’ve learned to other situations?

GOING FURTHER:
• Develop a job resume.
• Discuss developing a personal portfolio of your skills with a school counselor.

REFERENCES:

Author:
Gwen Bailey, Consultant
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
ADVANCING BY SETTING LONG-TERM GOALS
DAIRY CATTLE, LEVEL IV
Activity Sheet 1, Preparing Long-Term Goals

Long-term goals define your future. Select two of the following long-term goals that you might work on in Level IV.

**Check two (of your choice)**
- [ ] acquire more education
- [ ] get a job
- [ ] win a scholarship
- [ ] select a career path
- [ ] other ____________________________
- [ ] other ____________________________

**Now take one of these long-term goals and answer the following questions:**

One of my long-term goals is to:

__________________________________________________________________________
__________________________________________________________________________

I plan to reach this goal by:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

To reach this long-term goal, I will use my abilities of:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

To reach this long-term goal, I will need to improve on:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

When I reach my goal in the future, I will know it has been met by:

__________________________________________________________________________
__________________________________________________________________________
Understanding Feed Tags

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

• Items required on a feed tag
• Reasons for an item being listed on the tag
• Skills in selecting quality feeds for dairy cattle

ABOUT THEMSELVES:

• The need for labels and instructions
• How to give good directions or instructions
• The importance of following directions

Materials Needed:

• An actual feed tag for each member
• Member Handout 1, Feed Tag Requirements
• Member Handout 2, Net Energy Content
• Member Handout 3, Collective Terms for Feeds
• One poster board per individual or group
• One magic marker per individual or group
• Flip chart or chalkboard

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

When feed is purchased, many members assume the feed is of good quality and that it is the correct formula for their animals. But, how many of you inspect the feed tag to see what is in the feed?

Today, we’re going to put you in business as an owner of a feed mill and require you to prepare a feed tag; see if you can put all of the required items on your feed tag.

The Kansas Department of Agriculture is responsible for regulating the labeling of feeds and fertilizers. Feed manufacturers in Kansas are required to operate under the closed formula law. The law requires that commercial feed have a label which provides certain information.

This commercial feed law requires each bag or bulk load to be accompanied by a label or tag indicating the following information:

1. **Net Weight**: Total weight of contents.
2. **Product name and brand name**, if any. The feedname will often give an indication of the type of animal that should receive the feed. (Example “Grower Ration” for young calves.

3. **Drug additives**, if any;
   - Medicated feeds must show these items:
     - (a) The term “medicated”
     - (b) Name and amount of each drug
     - (c) Purpose for which drug was added
     - (d) Adequate precaution and warning statement

4. **Guaranteed analysis of the feed**—Crude protein, crude fat and crude fiber must be guaranteed on all feeds except straight mineral or vitamin supplements, molasses or drug compounds. Guarantees for other nutrients are optional depending on the desires of the manufacturer. A guarantee for protein, fat and fiber is not required for substances which primarily supply minerals.
   - (a) **Minimum percentage of crude protein, percentage of equivalent crude protein from non-protein nitrogen**, if any: The amount of crude or total protein in a feed is guaranteed. Crude protein is determined by multiplying the nitrogen content of a feed by the factor 6.25.
   - (b) When **non-protein nitrogen (NPN)** is added to feedstuffs, a statement “for ruminants only” must appear underneath the name of the feed. Additionally, it must also have a guarantee for crude protein which has been supplied from non-protein nitrogen. The feed tag requirements handout shows a feed containing 12 percent crude protein that includes not more than 1 percent equivalent crude protein from non-protein nitrogen. Correct interpretation of these figures would be that 1 percentage unit of the 12 percentage units of protein is coming from NPN. It is incorrect to assume that 1 percent of the 12 percent, which would amount to .01, is the amount of protein equivalent being supplied by NPN. If the equivalent crude protein exceeds 8.75 percent or one-third of the total crude protein, a **warning or caution statement** must appear on the feed tag.

Most vegetable or natural protein sources have a fairly constant nutritional value when fed to livestock. This is not true for NPN products, such as urea, biuret, or ammoniacal compounds. The feeding value of NPN products varies greatly with the level of feeding and amount of energy in the ration. Thus, in evaluating feeds, it is necessary to distinguish between crude protein and crude protein equivalent from the total crude protein guarantee. On the example feed label, there would be 11 percent protein coming from vegetable feed sources (12−1=11). For NPN to have feeding value, it must be converted into protein by the microbes in the ruminant animal’s stomach. A “thumb rule” can be useful when comparing similar
feeds for the same purpose. The feed having the greater percentage of natural protein would be worth more. Recommendations concerning the nutritional value and use of NPN products are discussed in other research and extension literature.

(c) **Minimum Crude Fat Content**—Fat has an energy value approximately 2.25 times the value of carbohydrates. Generally, the fat content of most feeds does not vary greatly, but feeds having higher fat values can be assumed to have higher energy values. Including more than 5 percent fat in the total diet of ruminant animals may cause digestive problems.

(d) **Maximum Crude Fiber Content**—Crude fiber is a measure of the indigestible, or non-useful portion of a feed. Crude fiber is not as accurate a measure of feed nutritional value as desired, but does provide a useful indication. Feeds having low fiber values tend to be higher in digestible energy or net energy than those feeds having high fiber values. The feed with a lower fiber value will generally be worth more.

(e) **Minerals**—Feeds containing 6.5 percent or more minerals must show a guarantee of.
   1) Calcium - minimum and maximum
   2) Phosphorus - minimum
   3) Salt - minimum and maximum

(f) **Vitamins, only if guaranteed.**

5. Common and usual name of each ingredient or the collective term for each grouping of feed ingredients. It is permissible for individual feedstuffs to be included in a mixed feed under collective terminology where the individual feedstuff is not identified.

6. **Directions for use and cautionary statements**—Feeding instructions are given with most feeds and must be provided where drugs or NPN products are used. You will benefit by carefully reading these instructions and heeding any warning or caution statements.

7. **Name and principle mailing address of the manufacturer.**

**SUMMARY**
Feed labels must include the information required by law and they also provide useful nutritional information. The ingredients in a commercial livestock feed do not have to be listed in any special order.

Periodic samples are analyzed to see if the manufacturer is meeting the guarantee expressed on the tag.
Being able to read and understand feed tags will help in selecting the correct feed for specific animals.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What are some of the basic feed tag requirements?
2. What is most difficult to understand about feed tags? Why?

**Process:**
3. How is the tag information used to balance a ration?
4. What safety precautions are often on tags? Why?

**Generalize:**
5. Why are government regulations necessary? Where else might you encounter them?
6. Are these regulations helpful or a hassle for you? Why? Why not?

**Apply:**
7. Think of a time when you failed to read or follow directions. What happened? What will you do differently next time?

**GOING FURTHER:**
- Visit a feed store and read feed tags. Compare labels.
- Visit a feed mill and see how they provide information to customers.
- Give an illustrated talk on How to Read a Feed Tag.
- Learn to identify some of the feedstuffs and become familiar with classification of these foodstuffs (collective terms).
- Read feed tags on feed sacks.
- Learn more about the Kansas Department of Agriculture.
### REFERENCES:
Kansas Department of Agriculture

### Authors:
Robert A. Rupp, Extension Livestock Specialist
Jimmy L. Rodgers, County Extension Agent, Texas

### Edited by:
James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University

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

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>Leader Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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11–Dairy Cattle, Level IV
**UNDERSTANDING FEED TAGS**

**DAIRY CATTLE, LEVEL IV**

Member Handout 1, Feed Tag Requirements

<table>
<thead>
<tr>
<th><strong>50 lbs. Net Weight</strong></th>
<th>Net wt. must appear on the tag (1).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAIRY GROWER RATION</strong></td>
<td>Name of feed (2). Statement must appear when NPN products such as urea, biurette, or ammonia-cal compounds are used (4b).</td>
</tr>
<tr>
<td>(for ruminants only)</td>
<td>When drugs are present, the word “medicated” must follow the brand or product name.</td>
</tr>
<tr>
<td><strong>MEDICATED</strong></td>
<td>A claim giving the purpose of the drug must appear (3c).</td>
</tr>
<tr>
<td>Feed for 28 days as an aid in the maintenance of weight gains in the presence of respiratory diseases, such as shipping fever.</td>
<td>Directions for use and precautionary statements must appear. Directions may appear elsewhere on the tag.</td>
</tr>
<tr>
<td><strong>WARNING:</strong> Feed only as Directed on this label. Discontinue use 7 days prior to slaughter.</td>
<td>The amount of an active drug ingredient must be given (3b).</td>
</tr>
<tr>
<td><strong>ACTIVE DRUG INGREDIENT</strong></td>
<td>Guaranteed analysis (4).</td>
</tr>
<tr>
<td>chlortetracycline</td>
<td>Minimum crude protein content (4a).</td>
</tr>
<tr>
<td>70 grams/ton</td>
<td>The percentage units of equivalent crude protein being supplied by NPN products (4b). If the equivalent crude protein exceeds 8.75% or 1/3 of the total crude protein, a WARNING or CAU-TION statement must appear.</td>
</tr>
<tr>
<td><strong>GUARANTEED ANALYSIS</strong></td>
<td>Minimum crude fat content (4c).</td>
</tr>
<tr>
<td>Crude Protein, not less than 12%</td>
<td>Maximum crude fiber content (4d).</td>
</tr>
<tr>
<td>(This includes not more than 1% equivalent crude protein from non-protein nitrogen.)</td>
<td>All ingredients must be listed unless collective terms are used (5).</td>
</tr>
<tr>
<td>Crude Fat, not less than 1.0%</td>
<td>Feeding instructions are usually provided and must appear if drugs or NPN are present (6).</td>
</tr>
<tr>
<td>Crude Fiber, not more than 22%</td>
<td>The name and principle mailing address of the manufacturer or person responsible for distributing the feed must appear on the tag (7).</td>
</tr>
<tr>
<td><strong>INGREDIENTS</strong>*</td>
<td>NOTE: Numbers in ( ) refer to description in text of lesson.</td>
</tr>
<tr>
<td>Ground corn, ground grain sorghum, dehydrated alfalfa meal, cottonseed hulls (37%), cottonseed meal, salt and limestone.</td>
<td></td>
</tr>
<tr>
<td><strong>FEEDING DIRECTIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Feed at the rate of 10 pounds per head per day.</td>
<td></td>
</tr>
<tr>
<td><strong>MANUFACTURED BY</strong></td>
<td></td>
</tr>
<tr>
<td>The Cow Feed Company</td>
<td></td>
</tr>
<tr>
<td>White City, Kansas</td>
<td></td>
</tr>
</tbody>
</table>

*State percent if roughage products are more than 5% of ingredients.
### UNDERSTANDING FEED TAGS

**DAIRY CATTLE, LEVEL IV**

* Member Handout 2, Net Energy Content

<table>
<thead>
<tr>
<th>Maximum Crude Fiber Guarantee (%)</th>
<th>Net Energy Maintenance (Mcal/lb)(^1)</th>
<th>Net Energy Lactation (Mcal/lb)(^1)</th>
<th>Net Energy Gain (Mcal/lb)(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>0.97</td>
<td>0.90</td>
<td>0.67</td>
</tr>
<tr>
<td>6.0</td>
<td>0.94</td>
<td>0.88</td>
<td>0.64</td>
</tr>
<tr>
<td>8.0</td>
<td>0.91</td>
<td>0.85</td>
<td>0.61</td>
</tr>
<tr>
<td>10.0</td>
<td>0.88</td>
<td>0.82</td>
<td>0.58</td>
</tr>
<tr>
<td>12.0</td>
<td>0.85</td>
<td>0.80</td>
<td>0.55</td>
</tr>
<tr>
<td>14.0</td>
<td><strong>0.82</strong></td>
<td><strong>0.77</strong></td>
<td><strong>0.51</strong></td>
</tr>
<tr>
<td>16.0</td>
<td>0.78</td>
<td>0.74</td>
<td>0.48</td>
</tr>
<tr>
<td>18.0</td>
<td>0.74</td>
<td>0.71</td>
<td>0.44</td>
</tr>
<tr>
<td>20.0</td>
<td>0.70</td>
<td>0.68</td>
<td>0.40</td>
</tr>
<tr>
<td>22.0</td>
<td>0.66</td>
<td>0.64</td>
<td>0.36</td>
</tr>
<tr>
<td>24.0</td>
<td>0.61</td>
<td>0.60</td>
<td>0.32</td>
</tr>
</tbody>
</table>

*Individual feeds may vary considerably from these values due to safety margins in the fiber guarantee, urea content and specific ingredients used. Estimates are not valid for salt limited feeds or liquid supplements.

\(^1\) Mcal = megacalorie = 1,000 kcal (human calories) = one million actual (small) calories

**Example:**

14% Fiber ration has a net energy for maintenance (NEM) of .82 and a net energy for growth (NEG) of .51

Requirements for 500-pound heifer to gain 1.75 pounds per day are:

NEM = 5.03 Mcal
NEG = 2.37 Mcal

Pounds feed fed for NEM = \(\frac{5.03}{0.82} = 6.13\)
Pounds feed fed for NEG = \(\frac{2.37}{0.51} = 4.64\)

Pounds of 14% fiber ration needed per day = 10.77
Collective terms recognize a general classification of ingredient origin, which perform a similar function, but do not imply equivalent nutritional values. When a collective term is used, individual ingredients within that group cannot be listed on the feed tag.

<table>
<thead>
<tr>
<th>ANIMAL PROTEIN PRODUCTS</th>
<th>FORAGE PRODUCTS</th>
<th>GRAIN PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal By-Product Meal</td>
<td>Hydrolyzed Poultry Feathers</td>
<td>Poultry By-Products</td>
</tr>
<tr>
<td>Fish By-Products</td>
<td>Meat and Bone Meal</td>
<td>Whey, Dried</td>
</tr>
<tr>
<td>Fish Meal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa Leaf Meal</td>
<td>Corn Plant, Dehydrated</td>
<td>Soybean Hay, Ground</td>
</tr>
<tr>
<td>Alfalfa Hay, Ground</td>
<td>Ground Grass</td>
<td></td>
</tr>
<tr>
<td>GRAIN PRODUCTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>Rice, Ground</td>
<td>Oats</td>
</tr>
<tr>
<td>Corn</td>
<td>Rye</td>
<td>Wheat</td>
</tr>
<tr>
<td>Grain Sorghum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLANT PROTEIN PRODUCTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut Meal</td>
<td>Guar Meal</td>
<td>Soybean Meal</td>
</tr>
<tr>
<td>Cottonseed Meal</td>
<td>Linseed Meal</td>
<td>Sunflower Meal</td>
</tr>
<tr>
<td>Cottonseed, Whole Processed</td>
<td>Peanut Meal</td>
<td>Yeast, Dried</td>
</tr>
<tr>
<td>PROCESSED GRAIN BY-PRODUCTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brewers Dried Grain</td>
<td>Malt Sprouts</td>
<td>Wheat Bran</td>
</tr>
<tr>
<td>Condensed Distillers, Solubles</td>
<td>Oat Groats, Oat Meal</td>
<td>Wheat Mids</td>
</tr>
<tr>
<td>Corn Gluten Feed</td>
<td>Rice Bran</td>
<td>Wheat Germ Meal</td>
</tr>
<tr>
<td>Grain Sorghum Mill Feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROUGHAGE PRODUCTS*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beet Pulp, Dried</td>
<td>Husks</td>
<td>Rice Hulls</td>
</tr>
<tr>
<td>Citrus Pulp, Dried</td>
<td>Oat Hulls</td>
<td>Rice Mill By-Product</td>
</tr>
<tr>
<td>Cottonseed Hulls</td>
<td>Peanut Hulls</td>
<td>Straw, Ground</td>
</tr>
<tr>
<td>MOLASSES PRODUCTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beet Molasses</td>
<td>Citrus Molasses</td>
<td>Solubles</td>
</tr>
<tr>
<td>Cane Molasses</td>
<td>Molasses Distillers, Condensed</td>
<td>Starch Molasses</td>
</tr>
</tbody>
</table>

*If roughage products constitute more than 5% of ingredients, the percent must be stated.
Principles of Balancing Dairy Rations
Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of feeding balanced rations
• The nutrients required in balanced dairy cow rations
• The factors that affect the nutrient requirements of balanced rations
• Principles of balancing rations

ABOUT THEMSELVES:
• Adjustments they make in everyday living situations
• The food energy need at different times of the year, life, or specific activities

Materials Needed:
• Member Handout 4, Nutrient Requirement Examples
• Member Handout 5, Nutrient Content of Feedstuffs
• Member Handout 6, Nutrient Requirements of Dairy Cattle
• Member Handout 7, Nutrient Requirements of Growing Dairy Heifers
• Activity Sheet 2, Nutrient Requirements Worksheet

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY
A member may have an outstanding dairy project with excellent facilities, but may not succeed because the feed ration is not balanced. Just as a chain is as strong as its weakest link, a dairy ration is as good as its most limiting nutrient. Feeding properly balanced rations lets dairy animals exhibit their potential.

A ration is the feed consumed by an animal during a 24-hour period. A balanced ration contains the proper amount of the required nutrients for an animal for a 24-hour period.

NUTRIENTS REQUIRED
The nutrients required for dairy cow rations include: (1) protein, (2) net energy lactation (NEL), (3) calcium, (4) phosphorus and (5) vitamin A. The requirements for salt and trace minerals can be met by including 0.5 percent trace mineral salt in the grain mix. Growing heifers need the same nutrients, except the energy requirements are expressed as net energy maintenance (NEM) and net energy gain (NEG).

Leader Notes
What is the difference in the terms ration and balanced ration? Group discussion and/or definition of ration and balanced ration.

Have members list some important feed sources of protein and NEL. Why are protein, calcium, and phosphorus important nutrients? NEL can be transferred from fat deposits in the cow’s body when the ration is deficient for a short period of time.
Leader Notes

Conduct a group discussion or listing of type of rations.

- Maintenance
- Growth
- Lactation
- Reproduction

ACTIVITY

TYPES OF RATIONS
Dairy animals are fed for different purposes, such as, maintenance, growth, gestation, or milk production. The maintenance requirements must be furnished before any nutrients can be utilized for the other purposes. Rations are prepared for several reasons. Can you name the reasons for certain types of rations? Rations are needed for maintenance, growth, lactation, and reproduction.

Maintenance rations are formulated to maintain the animal at its present weight and size. These rations are usually high in roughage and fiber, and contain small amounts of protein, minerals, and vitamins.

Growing rations are fed to encourage growth of young calves and animals being developed for breeding stock. These rations are relatively high in protein, energy, minerals, and vitamins.

Lactation rations are needed by milking cows. This type of ration must meet the requirements for body maintenance and production. Since milk production is the primary objective, rations for milk production must be high in protein, energy, and minerals.

Reproduction rations must provide an adequate supply of protein, energy, minerals, and vitamins. Pregnant dairy animals must receive adequate levels of these nutrients to allow for maintenance, growth, and development of the unborn calf. However, the demand for development of the unborn calf is very minimal until the last two months of gestation.

DETERMINE NUTRIENT REQUIREMENTS

Step 1. Select the type of dairy animal for which a ration is to be balanced (lactating cow, dry cow, or heifer). Indicate the body weight of the animal, the pounds of milk produced and milk fat percentage, or the daily gain for heifers.

Step 2. Using the Nutrient Requirement tables, list the nutrient requirements for the described animal.

Step 3. Next, add the amounts of the nutrient in each column from left to right and list the total in the right-hand column.

Step 4. Repeat steps 1, 2, and 3 with a higher level of milk production. Then, divide the NEL maintenance requirement by the NEL production requirements of the two levels of production. Is the maintenance requirement a lower percentage of the production requirement for the higher producing cow? Does this indicate higher efficiency for high production and the need to feed a balanced ration?
KANSAS 4-H

ACTIVITY

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What was the most difficult/easiest nutrient to balance in a ration? Why?

2. What ration adjustments did you make to “balance” the ration?

Process:
3. What nutrient is the most important for each of the five types of rations? Why

4. Why does a breeding heifer require a different ration than a lactating cow?

5. What adjustments or techniques can you use to produce a balanced ration in the most economical manner possible?

Generalize:
6. How do you make adjustments or changes in other 4-H projects to meet new needs or avoid problems?

Apply:
7. How can you apply what you learned about making adjustments and changes to new situations?

GOING FURTHER:
• Visit a feed store and select feeds for different purposes.
• Visit a dairy operation and find out the content of their rations.
• Compare the characteristics of rations for different classes of dairy cattle.
• Visit with a consulting ruminant nutritionist.
Leader Notes

ACTIVITY

REFERENCES:
Feeding Dairy Cows, MF-754 Revised, Cooperative Extension Service, Manhattan, Kansas, 1989
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas, 1991

Author:
Jimmy L. Rodgers, County Extension Agent, Texas

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18–Dairy Cattle, Level IV
KANSAS 4–H

PRINCIPLES OF BALANCING DAIRY RATIONS
DAIRY CATTLE, LEVEL IV
Member Handout 4, Nutrient Requirement Examples

Step 1. Select the type of dairy animal for which a ration is to be balanced (lactating cow, dry cow, or heifer). Enter the body weight and the milk produced and fat percentage for lactating cows or the daily gain for heifers.

<table>
<thead>
<tr>
<th>Description of Animal</th>
<th>Body Wt</th>
<th>Milk (lb)</th>
<th>% Fat</th>
<th>Daily Gain (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactating Cow</td>
<td>1300</td>
<td>60</td>
<td>3.5</td>
<td>—</td>
</tr>
<tr>
<td>Heifer</td>
<td>500</td>
<td>—</td>
<td>—</td>
<td>1.75</td>
</tr>
</tbody>
</table>

Step 2. Using the Nutrient Requirement tables, list the nutrient requirements for the described animal.

<table>
<thead>
<tr>
<th>Nutrients required</th>
<th>Maintenance Cow</th>
<th>Heifer</th>
<th>Cow Milk Production</th>
<th>Growth Heifer</th>
<th>Total Cow</th>
<th>Total Heifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (lb)</td>
<td>1.28</td>
<td>1.78</td>
<td>0.079 × 60 = 4.74</td>
<td>—</td>
<td>6.02</td>
<td>1.78</td>
</tr>
<tr>
<td>NEL (Mcal)</td>
<td>9.57</td>
<td>—</td>
<td>0.31 × 60 = 18.60</td>
<td>—</td>
<td>28.17</td>
<td>—</td>
</tr>
<tr>
<td>NEM (Mcal)</td>
<td>—</td>
<td>5.03</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.03</td>
</tr>
<tr>
<td>NEG (Mcal)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2.37</td>
<td>—</td>
<td>2.37</td>
</tr>
<tr>
<td>Calcium (lb)</td>
<td>0.053</td>
<td>0.050</td>
<td>0.003 × 60 = 0.18</td>
<td>—</td>
<td>0.18</td>
<td>0.05</td>
</tr>
<tr>
<td>Phosphorus (lb)</td>
<td>0.037</td>
<td>0.035</td>
<td>0.0018 × 60 = 0.233</td>
<td>—</td>
<td>0.233</td>
<td>0.035</td>
</tr>
<tr>
<td>Vitamin A (IU)</td>
<td>45,000</td>
<td>9,620</td>
<td>—</td>
<td>—</td>
<td>45,000</td>
<td>9,620</td>
</tr>
</tbody>
</table>

Step 3. Add the amounts of the nutrient in each column from left to right and list the total in the right-hand column.
## PRINCIPLES OF BALANCING DAIRY RATIONS

**DAIRY CATTLE, LEVEL IV**

*Member Handout 5, Nutrient Content of Feedstuffs*

<table>
<thead>
<tr>
<th></th>
<th>Dry Matter (Percent)</th>
<th>Crude Protein (Percent)</th>
<th>Mcal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roughages</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fescue Hay</td>
<td>88.5</td>
<td>10.5</td>
<td>0.54</td>
</tr>
<tr>
<td>Brome Hay</td>
<td>90.0</td>
<td>10.3</td>
<td>0.55</td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>89.2</td>
<td>17.1</td>
<td>0.58</td>
</tr>
<tr>
<td>Prairie Hay</td>
<td>92.0</td>
<td>5.8</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>Concentrates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn, shelled</td>
<td>86.5</td>
<td>9.9</td>
<td>0.91</td>
</tr>
<tr>
<td>Corn, ear</td>
<td>87.0</td>
<td>9.3</td>
<td>0.90</td>
</tr>
<tr>
<td>Barley</td>
<td>88.1</td>
<td>13.3</td>
<td>0.81</td>
</tr>
<tr>
<td>Oats</td>
<td>89.5</td>
<td>13.5</td>
<td>0.77</td>
</tr>
<tr>
<td>Grain Sorghum (Milo)</td>
<td>87.0</td>
<td>10.1</td>
<td>0.84</td>
</tr>
<tr>
<td><strong>Protein Supplements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottonseed Meal</td>
<td>92.5</td>
<td>44.3</td>
<td>0.74</td>
</tr>
<tr>
<td>44% Soybean Meal</td>
<td>89.0</td>
<td>51.5</td>
<td>0.81</td>
</tr>
<tr>
<td>49% Soybean Meal</td>
<td>89.8</td>
<td>56.7</td>
<td>0.84</td>
</tr>
</tbody>
</table>


2. Expressed on a dry matter basis.
### PRINCIPLES OF BALANCING DAIRY RATIONS
### DAIRY CATTLE, LEVEL IV
Member Handout 6, Nutrient Requirements of Dairy Cattle

<table>
<thead>
<tr>
<th>Body Weight (lb)</th>
<th>Protein (lb)</th>
<th>NEL (Mcal)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>0.88</td>
<td>7.27</td>
<td>0.036</td>
<td>0.026</td>
<td>31</td>
</tr>
<tr>
<td>1100</td>
<td>1.08</td>
<td>8.45</td>
<td>0.045</td>
<td>0.031</td>
<td>38</td>
</tr>
<tr>
<td>1300</td>
<td>1.28</td>
<td>9.57</td>
<td>0.053</td>
<td>0.037</td>
<td>45</td>
</tr>
<tr>
<td>1500</td>
<td>1.46</td>
<td>10.66</td>
<td>0.061</td>
<td>0.043</td>
<td>52</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body Weight (lb)</th>
<th>Protein (lb)</th>
<th>NEL (Mcal)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>1.54</td>
<td>9.45</td>
<td>0.059</td>
<td>0.036</td>
<td>31</td>
</tr>
<tr>
<td>1100</td>
<td>1.75</td>
<td>10.98</td>
<td>0.072</td>
<td>0.044</td>
<td>38</td>
</tr>
<tr>
<td>1300</td>
<td>2.03</td>
<td>12.45</td>
<td>0.086</td>
<td>0.052</td>
<td>45</td>
</tr>
<tr>
<td>1500</td>
<td>2.31</td>
<td>13.86</td>
<td>0.099</td>
<td>0.060</td>
<td>52</td>
</tr>
</tbody>
</table>

### Milk Production—Nutrients Per Pound of Milk of Different Milk Fat Percentages

<table>
<thead>
<tr>
<th>Milk Fat</th>
<th>Protein</th>
<th>NEL</th>
<th>Calcium</th>
<th>Phosphorus</th>
<th>Vitamin A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>0.079</td>
<td>0.31</td>
<td>0.0030</td>
<td>0.0018</td>
<td>—</td>
</tr>
<tr>
<td>4.0</td>
<td>0.086</td>
<td>0.33</td>
<td>0.0032</td>
<td>0.0020</td>
<td>—</td>
</tr>
<tr>
<td>4.5</td>
<td>0.092</td>
<td>0.36</td>
<td>0.0035</td>
<td>0.0021</td>
<td>—</td>
</tr>
<tr>
<td>5.0</td>
<td>0.100</td>
<td>0.38</td>
<td>0.0037</td>
<td>0.0023</td>
<td>—</td>
</tr>
</tbody>
</table>
## PRINCIPLES OF BALANCING DAIRY RATIONS

### DAIRY CATTLE, LEVEL IV

Member Handout 7, Nutrient Requirements of Growing Dairy Heifers

<table>
<thead>
<tr>
<th>Body Wt (lb)</th>
<th>NEM (Mcal)</th>
<th>NEG (Mcal)</th>
<th>Protein (lb)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Breeds (1.75 lb gain)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>3.43</td>
<td>1.86</td>
<td>1.31</td>
<td>0.043</td>
<td>0.025</td>
<td>5.77</td>
</tr>
<tr>
<td>400</td>
<td>4.25</td>
<td>2.12</td>
<td>1.62</td>
<td>0.047</td>
<td>0.030</td>
<td>7.69</td>
</tr>
<tr>
<td>500</td>
<td>5.03</td>
<td>2.37</td>
<td>1.78</td>
<td>0.050</td>
<td>0.035</td>
<td>9.62</td>
</tr>
<tr>
<td>600</td>
<td>5.76</td>
<td>2.60</td>
<td>1.94</td>
<td>0.053</td>
<td>0.039</td>
<td>11.54</td>
</tr>
<tr>
<td>700</td>
<td>6.47</td>
<td>2.82</td>
<td>2.10</td>
<td>0.055</td>
<td>0.041</td>
<td>13.46</td>
</tr>
<tr>
<td>800</td>
<td>7.15</td>
<td>3.04</td>
<td>2.26</td>
<td>0.056</td>
<td>0.043</td>
<td>15.39</td>
</tr>
<tr>
<td>900</td>
<td>7.81</td>
<td>3.25</td>
<td>2.54</td>
<td>0.063</td>
<td>0.046</td>
<td>17.31</td>
</tr>
<tr>
<td>1000</td>
<td>8.45</td>
<td>3.44</td>
<td>2.86</td>
<td>0.063</td>
<td>0.046</td>
<td>19.23</td>
</tr>
<tr>
<td>1100</td>
<td>9.08</td>
<td>3.65</td>
<td>3.22</td>
<td>0.063</td>
<td>0.046</td>
<td>21.16</td>
</tr>
<tr>
<td>1200</td>
<td>9.69</td>
<td>3.86</td>
<td>3.62</td>
<td>0.063</td>
<td>0.046</td>
<td>23.08</td>
</tr>
<tr>
<td><strong>Small Breeds (1.4 lb gain)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>2.53</td>
<td>1.48</td>
<td>0.99</td>
<td>0.036</td>
<td>0.018</td>
<td>3.85</td>
</tr>
<tr>
<td>300</td>
<td>3.43</td>
<td>1.71</td>
<td>1.30</td>
<td>0.040</td>
<td>0.023</td>
<td>5.77</td>
</tr>
<tr>
<td>400</td>
<td>4.25</td>
<td>1.97</td>
<td>1.40</td>
<td>0.043</td>
<td>0.028</td>
<td>7.69</td>
</tr>
<tr>
<td>500</td>
<td>5.03</td>
<td>2.22</td>
<td>1.52</td>
<td>0.047</td>
<td>0.033</td>
<td>9.62</td>
</tr>
<tr>
<td>600</td>
<td>5.76</td>
<td>2.45</td>
<td>1.80</td>
<td>0.050</td>
<td>0.037</td>
<td>11.54</td>
</tr>
<tr>
<td>700</td>
<td>6.47</td>
<td>2.66</td>
<td>2.14</td>
<td>0.052</td>
<td>0.039</td>
<td>13.46</td>
</tr>
<tr>
<td>800</td>
<td>7.15</td>
<td>2.88</td>
<td>2.51</td>
<td>0.054</td>
<td>0.041</td>
<td>15.39</td>
</tr>
<tr>
<td>900</td>
<td>7.81</td>
<td>3.07</td>
<td>2.94</td>
<td>0.062</td>
<td>0.042</td>
<td>17.31</td>
</tr>
</tbody>
</table>
PRINCIPLES OF BALANCING DAIRY RATIONS
DAIRY CATTLE, LEVEL IV
Activity Sheet 2, Nutrient Requirement Worksheet

Step 1. Select the type of dairy animal for which a ration is to be balanced (lactating cow, dry cow, or heifer). Enter the body weight and the milk produced and fat percentage for lactating cows or the daily gain for heifers.

<table>
<thead>
<tr>
<th>Description of Animal</th>
<th>Body Wt</th>
<th>Milk (lb)</th>
<th>% Fat</th>
<th>Daily Gain (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 2. Using the Nutrient Requirement tables, list the nutrient requirements for the described animal.

<table>
<thead>
<tr>
<th>Nutrients required</th>
<th>Maintenance</th>
<th>Milk Production</th>
<th>Growth</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEL (Mcal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEM (Mcal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEG (Mcal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus (lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A (IU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 3. Add the amounts of the nutrient in each column from left to right and list the total in the right-hand column.
How Much are Feeds Worth?

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to calculate the value of a feed based upon its nutrient content
• To use the information to make decisions about grain substitutions

ABOUT THEMSELVES:
• Algebra learned in school has practical applications
• How to substitute cost effective foods in their own diet
• Applying cost effective principles to other areas of their life

Materials Needed:
• Activity Sheet 3, Nutrient Value Worksheet
• Member Handout 8, Nutrient Content of Feeds Table
• Calculator

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

The price of different feeds may vary considerably from time to time due to a variety of reasons. Many times, some feeds are less expensive than others and could be substituted for more expensive ones if nutrients are furnished at a lower cost. By being able to calculate what feeds are worth, your dairy ration could be less expensive and, thus, provide the potential for improved profits.

The nutrients that have the greatest effect on feed value are protein and Net Energy Lactation (NEL). The value of various feed can be calculated by knowing the price of a grain (corn or milo) and a protein supplement (soybean meal). By using simultaneous equations we can determine the value of protein and NEL which can then be used to determine the value of other feeds. The following illustrates the use of simultaneous equations to determine the value of protein and NEL:

9X + 81Y = $4.50  
44X + 75Y = $10.00

9 ÷ 44 = 0.2045454  
44X × 0.2045454 = 9X

75Y × 0.2045454 = 15.34Y  
$10.00 × 0.2045454 = $2.045

Leader Notes

Note: This is a meticulous process that must be done step by step. With this understanding, young dairy producers will know how feed mills and consultants with computers are able to find the most economical rations.

Do as a total group activity before letting small groups practice.

Let X = the pounds of protein in 100 pounds of feed and Y = the Mcal of NEL/cwt.

The pounds of protein contained in corn is divided by the pounds of protein in soybean meal. This determines a multiplication factor. The soybean meal formula is then multiplied by the factor.
Pass out Activity Sheet 3, Sample Nutrient Value Worksheet and calculate the value of NEL and protein using the current price for corn and soybean meal.

Pass out Member Handout 8, Nutrient Content of Feeds Table, and calculate the value of some of the feeds you have available that might be substituted for corn and soybean meal.

Multiply the factor (0.2045454) times the protein and NEL content and price of soybean meal. The following equation will result:

\[ 9X + 15.34Y = 2.045 \]

This equation is substituted for the soybean meal equation and the new simultaneous equation will be as follows:

\[ 9X + 81Y = 4.50 \]
\[ 9X + 15.34Y = 2.045 \]

Subtract the new soybean meal equation from the corn equation which will provide a new equation with a zero value for protein.

\[ 9X + 81Y = 4.50 \]
\[ -9X - 15.34Y = -2.045 \]
\[ 0 + 65.66Y = 2.455 \]

Solve for \( Y \) by dividing both sides of the new equation by 65.66 to give the following results.

\[ Y = \frac{2.455}{65.66} = 0.0374 \text{ (value of a Mcal of NEL)} \]

Solve for \( X \) by substituting the value of NEL in the simultaneous equation:

\[ 9X + 81 \times 0.0374 = 4.50 \]
\[ 9X + 3.0294 = 4.50 \]

Subtract $3.0294 from both sides of the equation.

\[ 9X = 4.50 - 3.0294 = 1.4706 \]

Solve for \( X \) by dividing both sides of the equation by 9.

\[ X = \frac{1.4706}{9} = 0.1634 \text{ (value of a pound of protein)} \]

Now that the values of NEL ($0.0374/Mcal) and protein ($0.1634/lb) have been determined, the value of another feed may be determined by multiplying its NEL and protein contents by the value of NEL and protein. Example: barley contains 77 Mcal NEL and 12 pounds protein/cwt. Therefore, barley would be worth $4.84/cwt. or $2.32/bushel.

The value of protein in relation to energy is almost always much higher. Therefore, higher protein content feeds are worth more than lower ones. This assumes, of course, that there is a need for the protein by the animals for which it is intended.
DIALOOGUE FOR CRITICAL THINKING:

Share:
1. What was most difficult to understand in this lesson? Why?

Process:
2. What kinds of decisions can you make once you are able to do these calculations?

3. Some grains, such as wheat and oats, are used primarily for human food products. These grains are normally too expensive for dairy feed. However, sometimes these grains are competitively priced for dairy feed. Why?

Generalize:
4. How can you use this math in other areas of your life?

5. Are there ways you can incorporate the idea of substituting one kind of food for another for similar results in your own life?

Apply:
6. Look at things you use daily (not just food) clothing, appliances, luxury items. How can you make cost-effective substitutions in these areas of your life?

GOING FURTHER:
- Visit a feed company and ask how the ingredients included in its products are selected.
Leader Notes

ACTIVITY

REFERENCES:

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

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28–Dairy Cattle, Level IV
HOW MUCH ARE FEEDS WORTH?
DAIRY CATTLE, LEVEL IV
Activity Sheet 3, Nutritive Value Worksheet

\[9X + 81Y = \text{ corn price/cwt.}\]

\[44X + 75Y = \text{ soybean meal price/cwt.}\]

\[9 \div 44 = 0.2045454 \text{ (multiplication factor)}\]

\[44X \times 0.2045454 = 9X\]

\[75Y \times 0.2045454 = 15.34Y\]

Soybean meal price \(\times\) 0.2045454 = \text{__________}

\[9X + 15.34Y = \text{__________}\]

\[9X + 81Y = \text{__________}\]

\[9X + 15.34Y = \text{__________}\]

\[9X + 81Y = \text{__________}\]

\[-9X - 15.34Y = -\text{__________}\]

\[0 + 65.66Y = \text{__________}\]

\[Y = \text{__________} \div 65.66 = \text{__________}\]

\[9X + 81 \times \text{__________} = \text{__________} \text{ (corn price/cwt.)}\]

\[9X = \text{__________} - 81 \times \text{__________}\]

\[X = (\text{__________} - 81 \times \text{__________}) \div 9 = \text{__________}\]
### Forages

<table>
<thead>
<tr>
<th>Forages</th>
<th>Stage of Maturity</th>
<th>Protein (lbs./cwt.)</th>
<th>NEL (Mcal/cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa hay</td>
<td>Pre-bloom</td>
<td>20</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>1/10 bloom</td>
<td>17</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Full bloom</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>Brome hay</td>
<td>Pre-bloom</td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Late bloom</td>
<td>8</td>
<td>45</td>
</tr>
<tr>
<td>Corn Silage</td>
<td>Well eared</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>Prairie hay</td>
<td>Mid-season</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Sorghum silage</td>
<td></td>
<td>5</td>
<td>29</td>
</tr>
</tbody>
</table>

### Grains & Supplements

<table>
<thead>
<tr>
<th>Grains &amp; Supplements</th>
<th>Protein (lbs./cwt.)</th>
<th>NEL (Mcal/cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn (shelled)</td>
<td>9</td>
<td>81</td>
</tr>
<tr>
<td>Cottonseed meal</td>
<td>41</td>
<td>75</td>
</tr>
<tr>
<td>Cotton seeds</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>Barley</td>
<td>12</td>
<td>77</td>
</tr>
<tr>
<td>Milo</td>
<td>8</td>
<td>73</td>
</tr>
<tr>
<td>Oats</td>
<td>12</td>
<td>72</td>
</tr>
<tr>
<td>Soybeans</td>
<td>38</td>
<td>88</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>44</td>
<td>75</td>
</tr>
<tr>
<td>Wheat</td>
<td>12</td>
<td>82</td>
</tr>
<tr>
<td>Wheat mids</td>
<td>16</td>
<td>64</td>
</tr>
</tbody>
</table>
Feeding Heifers for Optimum Growth

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The optimum growth rate for heifers
• The nutritional needs of growing heifers
• The importance of feeding balanced rations
• The factors that affect the nutrient requirements

ABOUT THEMSELVES:
• Their own physical, social, mental and health performance
• How their diet varies as needs arise and situations change

Materials Needed:
• Chalkboard or flip chart to show problems in front of group
• Calculators (preferably one for each person)
• Member Handout 9, Heifer Growth Chart
• Member Handout 10, Nutritional Requirements for Growing Heifers
• Activity Sheet 4, Nutrient Requirements for Various Weights and Gains of Large Heifers

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

To determine if your heifers are growing fast enough, let’s compare the age and size of your heifers with the Heifer Growth Chart.

Heifers represent the future dairy herd. Proper nutrition is needed so that heifers will be grown and developed well enough to freshen by at least 24 months of age. Large breed heifers should weigh about 1,350 pounds at the time of calving while small breeds should weigh about 1,000 pounds.

The optimum rate of growth needs to be approximately 1.75 pounds per day for large breed heifers and 1.4 pounds per day for small breeds. These rates of growth need to be rather constant from the time the heifers are 3 months old until freshening to allow for adequate growth without fattening.

Heifer rations are balanced to meet the requirements for Net Energy Maintenance (NEM), Net Energy Gain (NEG), protein, calcium, phosphorus, and Vitamin A. In addition, trace mineralized salt is recommended at the rate of 0.5 percent of the grain mix to provide adequate amounts of trace minerals and salt.

Leader Notes

Ask each member to bring a list of the age, weight and breed of each of their heifers to this meeting.

Pass out Member Handout 9, Heifer Growth Chart.
Pass out Member Handout 10, Nutrient Requirements for Growing Heifers.

Pass out Activity Sheet 4, Nutrient Requirements for Various Weights and Gains of Large Heifers. Let members work in pairs as you lead them through the steps.

Note that the ratio of NEG:NEM is higher when the rate of gain is increased. A higher ratio indicates that the energy is more efficiently utilized.

The NEM required is affected only by body size. Therefore, the portion of feed used for maintenance decreases as daily gain increases. Thus, feeds are utilized more efficiently as the rate of gain increases.

Determining Nutrient Requirements

Dairy heifers require nutrients for maintenance and growth. Nutrients required for maintenance must be furnished before any nutrients can be used for growth. As the name implies, the maintenance requirement for nutrients is for maintaining the animal at its present size without any change in body weight. Therefore, nutrients for maintenance are used for body activities such as keeping warm, breathing, walking, and digesting feed. The size or weight of the animal determines its maintenance requirement.

If the requirement for maintenance has been met, then nutrients fed in excess of the maintenance requirement can be utilized for growth. The rate of gain will determine the amount of growth.

Using the Nutrient Requirement Table and the Nutrient Requirement Worksheet, list the nutrient requirements for heifers weighing 400, 600 and 800 pounds and gaining 1.5 and 1.75 pounds per day.

Step 1. Using the Nutrient Requirement Table, enter the requirements for heifers weighing 400, 600, and 800 pounds with daily gains of 1.5 and 1.75 pounds per day. Note that the maintenance requirement is determined by body size and not rate of gain.

Step 2. Divide the Net Energy Gain (NEG) requirement by the Net Energy Maintenance (NEM) requirement. Does this calculation indicate that a higher percentage of the nutrients are used for growth when the rate of gain is higher?

Ration formulation for growing heifers is a complicated procedure since two different energy values (NEM and NEG) are used for feeds. Therefore, computer ration formulation programs are much more convenient and will be covered in another lesson. However, it is important to understand the basics before utilizing a computer to become more efficient.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What was the hardest part for you to do on the Optimum Growth and Nutrient Requirements worksheet? Why?

Process:
2. Why is the maintenance requirement determined by body size rather than rate of gain?

3. What is the advantage of a higher rate of gain when using the NEG:NEM ratio?

Generalize:
4. What other activities does a dairy producer do that require the same kind of thinking skills required for this lesson?
5. In what other areas of your life is efficiency important? Why?

Apply:
6. How will the efficiency issues discussed here be useful in the future?

GOING FURTHER:
- Visit a dairy or heifer raising operation and ask how the heifers are fed.
- Visit a feed store or nutritionist and ask about their heifer feeding programs.

REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas 1991

Author:
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:
Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
**FEEDING HEIFERS FOR OPTIMUM GROWTH**
DAIRY CATTLE, LEVEL IV
Member Handout 9, Heifer Growth Chart

<table>
<thead>
<tr>
<th>Age (Months)</th>
<th>Holstein, Brown Swiss (lbs.)</th>
<th>Ayrshire, Guernsey (lbs.)</th>
<th>Jersey (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>90</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>130</td>
<td>115</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>260</td>
<td>210</td>
<td>180</td>
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<tr>
<td>6</td>
<td>375</td>
<td>305</td>
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<td>8</td>
<td>490</td>
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<td>720</td>
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<td>20</td>
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<td>945</td>
</tr>
<tr>
<td>24</td>
<td>1390</td>
<td>1160</td>
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</tr>
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</table>
## FEEDING HEIFERS FOR OPTIMUM GROWTH
**DAIRY CATTLE, LEVEL IV**
Member Handout 10, Nutritional Requirements For Growing Heifers

### LARGE BREEDS

<table>
<thead>
<tr>
<th>Body Wt (lb)</th>
<th>Daily Gain (lb)</th>
<th>NEM (Mcal)</th>
<th>NEG (Mcal)</th>
<th>Protein (lb)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>1.5</td>
<td>2.53</td>
<td>1.35</td>
<td>0.93</td>
<td>0.038</td>
<td>0.019</td>
<td>3.85</td>
</tr>
<tr>
<td>1.75</td>
<td>2.53</td>
<td>1.54</td>
<td>0.99</td>
<td>0.039</td>
<td>0.020</td>
<td>3.85</td>
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<tr>
<td>400</td>
<td>1.5</td>
<td>4.25</td>
<td>1.8</td>
<td>1.50</td>
<td>0.045</td>
<td>0.029</td>
<td>7.69</td>
</tr>
<tr>
<td>1.75</td>
<td>4.25</td>
<td>2.12</td>
<td>1.62</td>
<td>0.047</td>
<td>0.030</td>
<td>7.69</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.5</td>
<td>5.76</td>
<td>2.20</td>
<td>1.59</td>
<td>0.051</td>
<td>0.038</td>
<td>11.54</td>
</tr>
<tr>
<td>1.75</td>
<td>5.76</td>
<td>2.60</td>
<td>1.94</td>
<td>0.053</td>
<td>0.039</td>
<td>11.54</td>
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<tr>
<td>800</td>
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<td>2.10</td>
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<td>0.042</td>
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<td>1.75</td>
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<td>0.056</td>
<td>0.043</td>
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<td>0.046</td>
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<td>9.69</td>
<td>3.24</td>
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### SMALL BREEDS

<table>
<thead>
<tr>
<th>Body Wt (lb)</th>
<th>Daily Gain (lb)</th>
<th>NEM (Mcal)</th>
<th>NEG (Mcal)</th>
<th>Protein (lb)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
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<tr>
<td>200</td>
<td>1.4</td>
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<td>400</td>
<td>1.4</td>
<td>4.25</td>
<td>1.97</td>
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<td>7.69</td>
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<tr>
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<td>5.76</td>
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<tr>
<td>800</td>
<td>1.4</td>
<td>7.15</td>
<td>2.88</td>
<td>2.51</td>
<td>0.054</td>
<td>0.041</td>
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<tr>
<td>900</td>
<td>1.4</td>
<td>7.81</td>
<td>3.07</td>
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<td>0.062</td>
<td>0.042</td>
<td>17.31</td>
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</table>
### FEEDING HEIFERS FOR OPTIMUM GROWTH

**DAIRY CATTLE, LEVEL IV**

Activity Sheet 4, *Nutrient Requirements For Various Weights and Gains of Large Heifers*

**Step 1.** Using the Nutrient Requirement Table, enter the requirements for large heifers weighing 400, 600, and 800 pounds with daily gains of 1.5 and 1.75 pounds per day.

<table>
<thead>
<tr>
<th>Body Wt (lb)</th>
<th>Daily Gain (lb)</th>
<th>NEM (Mcal)</th>
<th>NEG (Mcal)</th>
<th>Protein (lb)</th>
<th>Calcium (lb)</th>
<th>Phosphorus (lb)</th>
<th>Vitamin A (IU, 1000)</th>
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</thead>
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<tr>
<td></td>
<td>1.75</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
</tr>
<tr>
<td>600</td>
<td>1.5</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
</tr>
<tr>
<td></td>
<td>1.75</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
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<tr>
<td>800</td>
<td>1.5</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
</tr>
<tr>
<td></td>
<td>1.75</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
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</tbody>
</table>

**Step 2.** Divide the Net Energy Gain (NEG) requirement by the Net Energy Maintenance (NEM) requirements.
Computerized Rations—Dairy Heifers

What Members Will Learn . . .

ABOUT THE PROJECT:
• To formulate a ration for dairy heifers
• To compare the nutrient requirements at various rates of growth
• To compare the effects of various ingredients in the ration

ABOUT THEMSELVES:
• The demand for nutrients in the diet is affected by several factors
• The computer can be used to make many decisions

Materials Needed:
• A PC compatible computer and printer
• The KSU Heifer computer program
• Member Handout 11, Sample Heifer Computer Ration Printout

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The feeding program for dairy heifers has a great impact on their performance, and, thus, the profitability of the dairy herd. Heifers should be grown well enough so that they will have adequate size and development to freshen by the time they are 24 months of age. The ideal growth rate is 1.75 pounds per day for large breed heifers and 1.4 pounds per day for small breed heifers. The rate of growth should be constant from the time heifers are 3 months old until they freshen. These rates of growth will allow for adequate growth without fattening.

Computer programs are available to conveniently balance rations for dairy heifers. Rations may be formulated by hand calculations but this process is quite laborious. This lesson will give the members the opportunity to formulate rations for dairy heifers. Another lesson may be used as a follow up to evaluate the value of ingredients by computer.

To run the program: At A:>\ type RUN HEIFER <enter>. The cell pointer will come to the space to enter the name, after typing the name, press <enter>. The cell pointer will then be located at the space for the address which will be entered after pressing <enter>.

The location of the cell pointer is designated by the letter at the head of the column and the row number on the left margin of the worksheet.
Example, the location of body weight is E5.

The following are suggested guides for inputs:

**Body Wt. (E5)**—enter by typing over the existing number the body weight of the heifer.

**Gain/day (H5)**—enter the daily gain desired. The recommended rate of gain is 1.75 pounds for large breed heifers and 1.4 pounds for small breeds.

**Forages (A10)**—Feed codes are shown beginning at K1. **Note all percentages must be entered as a decimal.** When an amount of forage is entered, its nutrient analysis is automatically entered from the feed code table.

**Forage amounts (C10)**—The rate of forage dry matter intake should equal about 1.6 percent of body weight. The amounts entered need to be adjusted so that the rate of forage dry matter intake shown at D36 is about 1.6 percent of body weight. If a forage is entered on the fourth line of the forage input section, the computer will calculate the amount the heifers will consume free choice by entering 0.1 pound at C13.

**Grains (A18)**—Enter the ratio of the grains to be included in the ration beginning at C18.

**Protein supplement (A23)**—Enter the protein supplement to be used from the feed code list.

**Phosphorus supplement (I25)**—A mineral supplement containing phosphorus must be entered. If the supplement contains calcium, enter the calcium percentage at (H25).

**Calcium supplement (H26)**—A mineral supplement containing calcium must be entered. If only one supplement is fed which contains calcium and phosphorus, enter the calcium percentage.

**Vitamin premix (E28)**—The vitamin A content of a vitamin premix should be entered in 1000s of units.

**Ionophore (I28)**—If an ionophore is fed, enter the concentration in mg/lb. If an ionophore is not going to be fed, leave the concentration at 1,000,000.

Let each member run their own ration on the computer. Then run their rations using different forages or different rates of gain.

**Output**—The amount of each ingredient needed in the grain mix is shown beginning at E39.
ACTIVITY

Ration specifications (B51)—Gives suggested guides.

Dry Matter Intake—The value at D51 should be similar to the value at D33. If not, less forage and more grain will need to be fed.

To Exit—Press /QY.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What information did you need to complete the program?
2. What problems, if any, did you have while running the program?

Process:
3. How does the grain mix affect the dietary requirements?
4. What was the most important ingredient? Why?

Generalize:
5. How does your diet affect you and the activities you do?
6. Are there things you learned about the computer that you can use in other areas of your life?

Apply:
7. How can you use a computer to create a balanced diet for you and your family?

GOING FURTHER:
• Try selecting different ingredients for the heifer ration to determine the effects on the grain mix needed.
• Use low quality forage as the input for forages to illustrate the additional requirements for a grain mix.

Leader Notes

Review your results and compare them to Member Handout 11, Sample Heifer Computer Ration Printout.

If the dry matter intake values shown at D33 and D51 are similar, then the remainder of the ration specifications should be reasonable.
Leader Notes

ACTIVITY

REFERENCES:
Raising Dairy Heifers, C-721, Cooperative Extension Service, Manhattan, Kansas 1991
Focus on Dairy—KSU Dairy Computer Programs, KSU Dairy Extension, Call Hall, Kansas State University, Manhattan, Kansas 1991

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

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40–Dairy Cattle, Level IV
**KANSAS 4-H**

**COMPUTERIZED RATIONS—DAIRY HEIFERS**

**DAIRY CATTLE, LEVEL IV**

Member Handout 11, Sample Heifer Computer Ration Printout

---

### KSU DAIRY RATION --- HEIFER

**DATE:** 03/09/98

<table>
<thead>
<tr>
<th>DATA INPUT</th>
<th>SEE INSTRUCTIONS @ A91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Data</td>
<td>Body Wt 600</td>
</tr>
<tr>
<td>Gain/day</td>
<td>1.75</td>
</tr>
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</table>

#### SEE FEED CODES @ K3.

**ADJUST FORAGE INTAKE SO THAT DM REQUIRED (D29) AND DM INTAKE ARE SIMILAR**

<table>
<thead>
<tr>
<th>Lbs/day</th>
<th>--DM%--NEM--DGE--Prot %--CA%--F%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Alfalfa Hay</td>
<td>5.0 90.0% 0.55 0.29 9.0% 0.28% 0.33%</td>
</tr>
<tr>
<td>42 Prairie Hay</td>
<td></td>
</tr>
<tr>
<td>14 COEN Silage</td>
<td>0.1 33.0% 0.74 0.47 8.4% 0.34% 0.20%</td>
</tr>
<tr>
<td>FREE CHOICE FORAGE</td>
<td>17.5</td>
</tr>
</tbody>
</table>

#### SEE GRAIN CODES @ K3.

<table>
<thead>
<tr>
<th>Enter Number</th>
<th>--Ratio--DM%--NEM--DGE--Prot %--CA%--F%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 Milo</td>
<td>100.0 88.0% 0.88 0.59 9.0% 0.03% 0.33%</td>
</tr>
<tr>
<td>61 Wheat</td>
<td></td>
</tr>
</tbody>
</table>

#### PROTEIN SUPPLEMENT

| 50 Soybean Meal-Solv | 83% 0.94 0.64 49.6% 0.30% 0.68% |

#### PHOSPHORUS SUPPLEMENT

| (enter % Ca and % P) | 23.0% 18.0% |

#### CALCIUM SOURCE

| (enter % Ca) | 38.0% |

#### VITAMIN PREMIX A units/lb (1000)

| 1000 | ICINOPHORE (mg/lb) | 1000000 |

---

### DATA OUTPUT (solved for NEM, NEG, Protein, Ca, P, Vitamins A)

---

<table>
<thead>
<tr>
<th>Nutrients needed/day</th>
<th>--DM%--NEM--DGE--Prot %--Ca%--F%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.28</td>
<td>6.06 2.74 1.86 0.054 0.040</td>
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</table>

<table>
<thead>
<tr>
<th>Forages/day</th>
<th>Forage Dry Matter Intake 1.71% Forage NDF Intake 1.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.26</td>
<td>6.74 0.41 0.89 0.032 0.026</td>
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</table>

#### Grain Mix Needed

<table>
<thead>
<tr>
<th>Soybean Meal-Solv</th>
<th>DM-basAR-basis</th>
<th>% of Mix lbs/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.54</td>
<td>1.73</td>
<td>36.48% 730</td>
</tr>
</tbody>
</table>

| Milo | 2.58 | 61.73% 1235 |

---

<table>
<thead>
<tr>
<th>lbs P supp.</th>
<th>lbs Ca suppl.</th>
<th>lbs Bicarb</th>
<th>lbs T M Salt</th>
<th>lbs Vit Premix</th>
<th>lonsinophore</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.04</td>
<td>0.90%</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

---

### RATION SPECIFICATIONS

<table>
<thead>
<tr>
<th>DM Intake --(lb)--</th>
<th>14.5</th>
<th>Grain Mix --(lb)--</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM Intake --(%) BW--</td>
<td>2.4</td>
<td>Grain Prot--(%AR)</td>
</tr>
<tr>
<td>NDF--(lb)</td>
<td>6.4</td>
<td>NEM--(Mcal/lb DM)</td>
</tr>
<tr>
<td>NDF--(% of DM)</td>
<td>44.3</td>
<td>NEG--(Mcal/1b DM)</td>
</tr>
<tr>
<td>Protein--(% of DM)</td>
<td>12.9</td>
<td>Calcium--(% of DM)</td>
</tr>
<tr>
<td>UPR--(% of Prot)</td>
<td>38.0</td>
<td>Phos--(% of DM)</td>
</tr>
<tr>
<td>Feed DM/1b Gain---</td>
<td>8.27</td>
<td>Total Ration--(%AF)</td>
</tr>
</tbody>
</table>

---

**BW = Body Weight**

Summary: The boxed figures indicate that the ration needed for a 600-pound dairy heifer to gain 1.75 pounds per day is:

- 5.0 lbs. brome hay
- 17.6 lbs. corn silage (fed free choice)
- 4.7 lbs. grain mix (soybean meal, milo, minerals)
- 27.3 lbs. of ration
Dairy cattle are evaluated by their (1) producing ability, (2) conformation (type) and (3) pedigree. The milk producing ability of dairy cows is evaluated by a production testing program called the Dairy Herd Improvement (DHI). However, heifers’ productivity cannot be evaluated until they are milking. Therefore, their potential productivity has to be evaluated by their conformation and pedigree. The pedigree is a better means of evaluating a heifer’s potential productivity than conformation.

A pedigree is a record of ancestors, a family tree. The basic difference between registered and nonregistered (grade) dairy cattle is that the ancestors have been recorded by a breed association. Grade dairy cattle can have a pedigree if their ancestors have been recorded.

Pedigrees are arranged in brackets with the males’ identification on the top of each bracket and the females’ identification on the bottom. Dairy cattle breeders refer to the top side of the pedigree as the sire’s and the bottom side as the dam’s. In addition to the identification, each part of the bracket contains production and genetic evaluations that are known about the ancestors.

Pass out Member Handout 12 and 13, Sample Dairy Pedigree and Second Sample Dairy Pedigree. Discuss the information shown on the pedigree.
Leader Notes

Find each PTA on a sample pedigree and discuss. Practice matching abbreviations with terms until members are familiar with them.

Have members evaluate the two pedigrees and determine which is the better pedigree.

ACTIVITY

Information contained in a pedigree.

1. Name, identification number and date of birth.

2. Classification information, if available. Classification is a means of evaluating the type or conformation of the animal.

3. Genetic information which is designated as PTA’s (Predicted Transmitting Ability) for milk (PTAM), fat (PTAF), protein (PTAP), and type (PTAT). In addition, the PTA values for milk, fat and protein are converted to a dollar value. These are designated as PTA$ for Cheese Yield (PTACY$), Fat (PTAF$), Protein (PTAP$), and combined milk, fat and protein (PTAMFP$).

4. Another genetic evaluation is the TPI (Total Performance Index) which includes the PTA’s for milk, fat, protein and type in one evaluation. The same TPI for cows is labeled “CTPI.”

5. The reliability of the genetic information will be shown with an R. Reliability values range from about 20 to 99 and are expressed as percentages. The reliability values are determined by the number of records used in calculating it—the higher the number of records, the higher the reliability. Reliability is actually a measure of the accuracy of the information.

6. Milk production records of cows. These records will show the age when each record was started, the number of times milked each day, the number of days in the record, the pounds of milk, fat and protein as well as the percentage of these components.

When evaluating a pedigree, you should remember that the information known about the closest ancestors is the most important and that each generation contributes to 100 percent of an animal. The sire and dam each contribute 50 percent of the genetics to an individual. The grandsires and granddams each contribute 25 percent to an animal’s genetics since there are four individuals involved. Since great grandsires and great granddams only contribute 12 1/2 percent to an individual’s genetics, there is little reason to put much emphasis on this generation. (8 × 12 1/2 percent = 100 percent)

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What is a pedigree?
2. How is a pedigree arranged?
3. What kinds of information can you get from a heifer’s pedigree?
Process:
4. Why is a pedigree important?

5. Would you buy a calf without a pedigree? Why or why not?

Generalize:
6. Why would it be important to know your family history?

Apply:
7. How do doctors use family medical histories in modern medicine?

GOING FURTHER:
• Attend a dairy cattle auction. Observe that the cattle with the better pedigrees are in the greatest demand.
• Research your own family history.

REFERENCES:

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

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## WHAT’S IN A PEDIGREE?
### DAIRY CATTLE, LEVEL IV
Member Handout 12, Sample Dairy Pedigree

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<tr>
<td>5-01 2X 305 23100 3.8 878</td>
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</table>

*PTA* = Predicted transmitting ability

*PTAS* = Predicted transmitting ability for sons

*PTAT* = Predicted transmitting ability for daughters

*CY* = Component yield

*F* = Fat

*P* = Protein

*CTPI* = Component test percentage index

*TPI* = Test percentage index

*GM* = Gold merit

*EX* = Excellent merit

*VG* = Very good merit

*VG87* = Very good merit 87%
## WHAT’S IN A PEDIGREE?
### DAIRY CATTLE, LEVEL IV

**Member Handout 13, Second Sample Dairy Pedigree**

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WHAT IS IN A PEDIGREE?
Sire Selection

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of sire selection
• How to select sires

ABOUT THEMSELVES:
• How decisions made today affect the future

Materials Needed:
• Sire Summaries for each member
• Member Handout 14, Sire Summary Terms
• Activity Sheet 5, Sire Evaluation Matching Game (two copies per member)
• Leader’s Key, Activity Sheet 5, Sire Evaluation Matching Game

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Sire selection is an important decision for every dairy farmer. Although the process may not seem so important at the time, the sires selected for use this year will affect the productivity of about one-third of the herd three years later when those heifers freshen.

Through the use of artificial insemination (AI), calves born today should have greater potential for production and type than their ancestors because the bulls have been highly selected for these traits.

Sires are selected for use in AI by evaluating their daughter’s milk production through the DHIA program. The type characteristics of their daughters comes from classification scores made by the various breed associations.

When at least 10 daughters have production and type information, a summary is made of that information by the USDA. This information is published in the USDA Sire Summary twice each year, in January and July. These sires are known as proven sires. Only the higher proven sires are selected for use in AI. Therefore, the surest way to improve productivity of future generations is to select AI sires for mating to your cows and heifers.

Leader Notes
Pass out Activity Sheet 5, Sire Evaluation Matching Game. Let members match terms as a pre-test to give you an idea as to what terms you need to study the most.
The summarized information is actually a genetic evaluation of the sires indicating how the sire will transmit various traits to his offspring. This evaluation is called Predicted Transmitting Ability (PTA) which is based upon how much better or poorer the sires’s daughters are than their herdmates.

Sire Summaries contain the following information:

- **PTAM, PTAF, PTAP, PTA %F, and PTA %P**: are the PTA’s for pounds of milk, fat, and protein or percent fat and protein. These values indicate how much more (or less) production to expect from the average daughter of a sire than a sire with a PTA of zero. Hence, sire summaries rank sires according to their production transmitting abilities.

- **PTA MFP$**: reflects the PTA dollar value based upon the additional pounds of milk adjusted for percent fat and protein test. This PTA indicates how much additional gross income to expect for each lactation. The PTA MFP$ will vary from time to time depending on the price of milk and the differential paid for fat and protein tests. A similar PTA MF$ evaluation is made which uses milk pounds and fat percent differential.

- **PTA CY$**: is the PTA cheese yield dollars. This value reflects the additional value per lactation if milk is priced according to its value to make cheddar cheese.

- **PTAT**: is the PTA for dairy breed type. The value is the expected difference in final score between daughters of the sire and breed average sires.

- **TPI**: is the Type-Production Index. This index evaluates the PTA for both production and type. The formula used to calculate TPI places an emphasis of three on PTAP and one on PTAF, PTAT and udder composite traits.

- **%DBH**: is an evaluation of the percent difficult births in heifers which indicates calving ease. Dairy farmers use this information when selecting sires for breeding heifers.

- **Reliability**: is a measure of the accuracy of genetic evaluations. Reliability is determined by the number of daughters of a sire, the number of records, and the number of farms where those records were made. The closer reliability is to 100 percent, the more reliable the PTA.

- **Percentile Rank**: is the relative ranking of AI sires for their PTA MFP$. The highest ranking sires will be in the 99th percentile, the lowest in the 0 percentile.

Pass out a Sire Summary to each member. Sire Summaries may be obtained from most AI organizations or they may be photocopied from the February 25 or August 25 issues of the Hoard’s Dairyman magazine. Discuss the information in the summary. Have members select one to two sires to mate to their heifers and give their reasoning.
**ACTIVITY**

**Sire Selection Made Easy.** Considering all of the different means for evaluating sires, it appears that sire selection is complicated. However, sire selection is relatively simple because sires are numerically ranked for their PTA MFP$ which is an excellent economic ranking. If sires that rank in the 80th percentile or higher are selected, then excellent improvement in production potential can be made.

Dairy breed type should be considered in addition to production when selecting sires. Therefore, one should consider selecting sires that meet the production requirements and are plus for PTAT. Using TPI as a selection criteria is a simple way to make good improvement in production and type potential.

Sires selected for use on heifers should be selected for production, type and calving ease. Outstanding calving ease sires are available with less than 10 percent difficult births in heifers.

The other consideration in sire selection is to avoid mating close relatives. The pedigrees of AI sires are available from the AI organizations.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. Do you think using PTA’s is easy? Why or why not?

**Process:**
2. What are the advantages to using PTA’s? Disadvantages?
3. How important is sire selection to the dairy producer?
4. How important is using PTA’s to improve future generations of dairy cattle?

**Generalize:**
5. Can you predict how your actions will affect the future?
6. How can you use future goals to dictate your actions today?

**Apply:**
7. Define one goal that you would like to accomplish in the future. What actions will you take to make sure your goal is accomplished?

**GOING FURTHER:**
- Visit with a representative from an AI organization about the price of a unit of semen from sires ranked in the top 80th percentile. Ask the representative about their organization’s program of type evaluation for making mating recommendations.

Review the terms by using Activity Sheet 5, Sire Evaluation Matching Game, again as a post-test.
Leader Notes

ACTIVITY

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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SIRE SELECTION
DAIRY CATTLE, LEVEL III
Member Handout 14, Sire Selection Terms

**PTAM**—Predicted Transmitting Ability for pounds of milk. This value indicates the average pounds of milk per lactation that mature daughters of a sire will produce compared to mature daughters of a sire with a PTAM of zero.

**PTAF**—Predicted Transmitting Ability for pounds of fat. This value indicates the average pounds of fat per lactation that mature daughters of a sire will produce compared to mature daughters of a sire with a PTAF of zero.

**PTA%F**—Predicted Transmitting Ability for percent fat. This value indicates how much higher (or lower), the test for percent fat will be for average daughters of a sire, compared to daughters of a sire with a PTA%F of zero.

**PTAP**—Predicted Transmitting Ability for pounds of protein. This value indicates the average pounds of protein per lactation that mature daughters of a sire will produce compared to mature daughters of a sire with a PTAP of zero.

**PTA%P**—Predicted Transmitting Ability for percent protein. This value indicates how much higher (or lower), the test for percent protein will be for average daughters of a sire, compared to daughters of a sire with a PTA%P of zero.

**PTA MFP$**—Predicted Transmitting Ability for Milk-Fat-Protein Dollars. This value indicates how much more (or less) income average mature daughters of a sire will generate each lactation compared to daughters of a sire with a PTA MFP$ of zero. This is calculated from the PTAM, PTA%F and PTA%P adjusted for milk price and the differentials for fat and protein.

**PTA MF$**—Predicted Transmitting Ability for Milk-Fat Dollars. This value is the same as PTA MFP$ except PTA%P is not used in the calculation.

**PTA CY$**—Predicted Transmitting Ability for Cheese Yield Dollars. This value indicates how much more (or less) income, average mature daughters of a sire will generate each lactation, compared to daughters of a sire with a PTA CY$ of zero. PTA CY$ is determined by the value of the milk for making cheddar cheese.

**PTAT**—Predicted Transmitting Ability for Type. This value indicates how much higher (or lower) the sire’s average daughters will classify for breed type compared to breed average cows.

**TPI**—Type-Production Index. This value is an evaluation for both production and type. TPI is calculated by multiplying PTAP by 3 plus PTAF, PTAT and udder composite score.

**REL**—Reliability is a measure of the accuracy of the genetic evaluation. This value is determined by the number of daughters, number of herds, and number of records per daughter. The closer the value is to 100, the more reliable the PTA’s.

**%DBH**—This is the estimate of the Percentage of Difficult Births in Heifers when they calve the first time. This value indicates calving ease.

**PERCENTILE**—Is a relative ranking of sires for PTA MFP$. The highest ranking sires will be in the 99th percentile, the lowest in the 0 percentile.
Place the number of the term from the column on the left in front of the best description of the term.

1. PTAM
   ____ This value indicates improvement in fat test.

2. PTAF
   ____ This value indicates the increased value of the milk and fat produced.

3. PTAP
   ____ This value indicates how high a sire ranks based on PTA MFP$.

4. PTA%F
   ____ This value indicates how much more (or less) fat will be produced.

5. PTA%P
   ____ This value indicates how much more (or less) milk will be produced.

6. PTA CY$
   ____ This value indicates how much higher (or lower) the daughters will classify compared to average breed type.

7. PTAT
   ____ This value indicates calving ease.

8. TPI
   ____ This value combines production and type into one evaluation.

9. %DBH
   ____ This value indicates how much higher (or lower) the daughters will test for protein.

10. REL.
    ____ The value indicates how much more (or less) income will be produced due to increased milk pounds adjusted for fat and protein test.

11. PERCENTILE
    ____ This value indicates how much more (or less) protein will be produced.
KANSAS 4–H

SIRE SELECTION
DAIRY CATTLE, LEVEL III
Leader’s Key, Activity Sheet 5, Sire Evaluation Matching Game

Place the number of the term from the column on the left in front of the best description of the term.

1. PTAM  __4__ This value indicates improvement in fat test.
2. PTAF  __7__ This value indicates the increased value of the milk and fat produced.
3. PTAP  __13__ This value indicates how high a sire ranks based on PTA MFP$.
4. PTA%F __2__ This value indicates how much more (or less) fat will be produced.
5. PTA%P __8__ This value indicates the increase (or decrease) in value of the milk for making cheddar cheese.
6. PTA CY$ __1__ This value indicates how much more (or less) milk will be produced.
7. PTA CY$ __9__ This value indicates how much higher (or lower) daughters will classify compared to average breed type.
8. PTAT __12__ This value is determined by the number of daughters, farms and records.
9. TPI __3__ This value indicates how much more (or less) protein will be produced.
10. %DBH __11__ This value indicates calving ease.
11. REL. __10__ This value combines production and type into one evaluation.
12. PERCENTILE __6__ The value indicates how much more (or less) income will be produced due to increase milk pounds adjusted for fat and protein test.
13. PERCENTILE __5__ This value indicates how much higher (or lower) the daughters will test for protein.
Anatomy of the Female Bovine Reproductive Tract

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• Be able to identify the parts of a female bovine reproductive tract
• Learn how the anatomy is related to its function

ABOUT THEMSELVES:
• The contribution of each part to the success of the whole system

Materials Needed:
• If possible, female bovine reproductive organs—may be obtained from processing plant
• Activity Sheet 6, Female Bovine Reproductive Tract
• Leader’s Key, Activity Sheet 6, Female Bovine Reproductive Tract
• One large blank diagram of female bovine reproductive tract
• Pencils for each member
• Tape
• Small pieces of paper on which are written the names of the various parts of the female bovine reproductive tract
• Access to a heifer or cow would be helpful in order to point out the external anatomy (optional)

ACTIVITY TIME NEEDED: 30-45 MINUTES

ACTIVITY

What is a dairy cow’s purpose? Basically, it is to produce milk, but to do this, she must have a calf. This poster lists the different parts of the heifer and cow’s reproductive tract; it is a larger version of your handout. Let’s see how many parts you can label.

Some of these labels may be in the wrong place, but we’ll start going through them and if they’re in the wrong place, we’ll move them.

This is the vulva, it is the external opening to the reproductive tract.

This is the vagina; it is the tube that connects the vulva with the uterus.

This is the cervix. It provides a barrier that protects the uterus from infection and foreign debris. It also provides a “plug” when the cow is pregnant.

Leader Notes

Post the large diagram of the reproductive tract on a wall without the names of the parts on it. Give each member a piece of paper with the name of a part on it and have them tape the part onto the diagram in what they believe is the correct location. Let the group discuss each identified part and reach a consensus before giving correct labels. This is a skillathon situation.

Hand out Activity Sheet 6, Female Bovine Reproductive Tract so that the members can fill it in after they have reached consensus.

Use the large diagram with the papers on it to show the tract.
This is the uterus, where the fetus—or the baby calf—develops during pregnancy. In cattle, the uterus has two horns that curl under. The calf grows in one of the horns and stretches it as it grows. After it is born, the uterus will go back to nearly normal size.

This is the broad ligament, a tough fibrous band of tissue that holds the uterus in place.

This is the ovary. The eggs develop here. It is also a source of the female reproductive hormones, estrogen and progesterone. Estrogen is a chemical produced as a signal to the body to develop female traits. At the proper time, the ovary releases the egg into the oviduct.

This is the oviduct. Fertilization takes place here. The fertilized egg travels down the oviduct to the uterus to develop.

The development of a calf is a very complex process; these are the important parts of the cow that create, feed and protect the calf until it is born.

Heifers may come into heat as early as 5 or 6 months of age, but they are not physically large enough to have a calf and they are still growing. Most producers breed their heifers at about 13 to 15 months of age, sometimes later than that. Thus, the heifer is mature enough to deliver a calf nine months later.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. If fresh female bovine reproductive organs were available, did they look much like the paper diagrams? Explain what you saw.

2. What part of the reproductive tract was most difficult to understand?

**Process:**
3. What is the purpose of each cow reproductive tract part? List and discuss.

4. At what age are dairy heifers normally bred? Why?

**Generalize:**
5. What things do you think might affect the ability of cows and heifers to produce normal healthy eggs?

6. What is the economic impact of having heifers or cows that have trouble getting bred or cannot become pregnant?

**Apply:**
7. How can information in this lesson be useful in preventing future breeding problems?
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59–Dairy Cattle, Level IV
ANATOMY OF THE FEMALE BOVINE REPRODUCTIVE TRACT
DAIRY CATTLE, LEVEL III
Activity Sheet 6, Female Bovine Reproductive Tract

Label the Parts on the Diagram

V = vulva  U = uterus  L = broad ligament  Vr = vertebrae
Va = vagina  O = ovary  P = pelvic bone  B = bladder
C = cervix  F = oviduct  R = rectum
ANATOMY OF THE FEMALE BOVINE REPRODUCTIVE TRACT
DAIRY CATTLE, LEVEL III
Leader’s Key, Activity Sheet 6, Female Bovine Reproductive Tract

Label the Parts on the Diagram

V = vulva    U = uterus    L = broad ligament    Vr = vertebrae
Va = vagina  O = ovary    P = pelvic bone      B = bladder
C = cervix   F = oviduct   R = rectum
The Cow’s Estrous Cycle and the Process of Fertilization

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
- The sexual nature of the cow
- The process of fertilization

ABOUT THEMSELVES:
- Importance of various cycles
- Importance of sequence and timing in their lives

Materials Needed:
- Activity Sheet 7, Reproductive Definitions Worksheet
- Leader’s Key, Activity Sheet 7, Reproductive Definitions Worksheet
- Member Handout 15, Major Reproductive Organs of the Cow
- Member Handout 16, Reproductive Definitions
- Chalkboard or writing surface

ACTIVITY TIME NEEDED: 60 MINUTES

ESTROUS CYCLE
Unlike wild animals, cows are not seasonal in their sexual nature. For instance, in deer, mating generally occurs during the cold months of the year, and at no other time. However, cows will mate at any time during the year, except shortly after calving. It is at this time that the cow must recover from calving before she is able to rebreed. This recovery period takes about 40 to 50 days. Undue stress, such as poor nutrition, will lengthen this period. Thus, proper nutrition is necessary to overcome a lengthy delay in recovery after calving.

What happens after the cow has calved? First, she must expel the placental membranes which usually takes no longer than 12 hours. Generally, the membranes are expelled within minutes after calving. Next, her uterus must return to its original size by expelling fluids and old tissues. This takes about 30 to 40 days. Then, the cow is ready to resume her normal 21-day estrous cycle. Normal cycles may range from 18 to 24 days. The estrous cycle is characterized by heat periods (that time when she accepts the bull for mating) at regular 21-day intervals. The heat period lasts for about 14 hours (range of 8 to 24 hours). This is the only time within the 21-day cycle that the cow allows a bull to mate. If she mates but does not conceive, she should be back in heat again 21 days later. This 21-day
period of cyclic activity continues until she conceives, and when she does, heat periods stop. The cow will not mate again until after the calf is born.

The reasons that the estrous cycle is 21 days long are very complex. The 21-day cycle occurs because of hormones that are released/produced in regular cycles. Any malfunction in hormone production due to stresses such as disease and poor nutrition can upset the cow’s estrous cycle and prevent her from breeding. Obviously, this is undesirable, so producers and members should take care of their cows so that these stresses are avoided. This can be accomplished through good management practices such as vaccinations against disease and feeding cows properly.

SUMMARY
Remember that cows are not seasonal in their sexual nature. After calving (whenever that occurs), the cow needs a 40 to 50 day recovery period in order to resume her 21-day estrous cycle. This cycle is characterized by heat periods which occur at 21-day intervals. If she conceives, heat periods stop, and the cow will not rebreed until after the calf is born. Keep in mind that disease and poor nutrition will upset the 21-day estrous cycle and prevent a cow from breeding. Good management will ensure that these problems are overcome.

FERTILIZATION PROCESS
Now that we understand the estrous cycle of the cow, we should discuss what happens during fertilization. This process (fertilization) involves the union of a sperm from the male with an ovum (egg) from the female. At mating, the male deposits semen (sperm-rich fluid) into the vagina of the female. In artificial insemination (AI), sperm cells are placed in the uterine body. The sperm cells migrate up the female reproductive organ to the site of fertilization which occurs in the oviduct. On their way to the oviduct, the sperm cells are partially separated into two groups: normal and abnormal cells. The group that reaches the oviduct is comprised mostly of normal cells. The first sperm cells reach the site of fertilization in less than 5 minutes. Once in the oviduct, the sperm cells undergo a 6- to 10-hour period of adjustment called capacitation. Unless capacitation is complete, a sperm cell cannot fertilize the egg.

At this point, the egg has not yet arrived at the site of fertilization. It generally does not get there until 24 hours after the cow initially exhibits heat.

Therefore, the sperm cells spend time waiting for the egg to arrive. This is rather fortunate because the sperm need time to undergo capacitation.

Where has the egg been during all this? The egg has been sitting in a follicle on the ovary, waiting to be released. Release (ovulation) occurs about 24 hours into the heat period. Once ovulation occurs, the egg is quickly swept into the infundibulum, into the oviduct, and in a matter of minutes reaches the site of fertilization. There, the sperm cells are waiting
to unite with it. Even though thousands of sperm cells are waiting there, only one completes the actual fertilization. The waiting sperm cells surround the egg and attack it with chemicals which allow them to penetrate the wall of the egg. Once a single sperm penetrates deep enough, the egg reacts and does not allow any other sperm to penetrate the egg. In a sense, the door is closed behind that single entering sperm cell. Thus, the act of fertilization is completed. Sperm cells that did not enter the egg will die and be absorbed by the walls of the oviduct.

The result of fertilization is a new embryo which, after about 6 days, reaches the uterus and develops into a new calf. This development period is called gestation and it lasts about 280 days.

**SUMMARY**
Sperm cells migrate to the site of fertilization and undergo a period of maturation called capacitation. This period lasts 6 to 10 hours. About 24 hours into the heat period, the egg is released and is quickly swept into the infundibulum and eventually into the oviduct. Once there, it is surrounded by thousands of sperm cells, of which, only one is allowed to penetrate. Sperm cells which do not penetrate will die and be absorbed into the oviduct walls.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What information about a cow’s estrous cycle and/or the fertilization process was new to you?

2. Why is it important to understand the cow’s estrous cycle in your planning?

**Process:**
3. What problems may upset the estrous cycle and prevent a cow from breeding?

**Generalize:**
4. What are the economic and management implications of knowing about a cow’s estrous cycle?

5. What other cycles impact livestock production? (weather, market cycles, etc.)

**Apply:**
6. What is the significance of each cycle that affects you as a livestock manager?

7. How will this discussion of cycles help you in the future?
GOING FURTHER:
• Start a notebook for dairy cattle materials. If the members continue to work with and raise cows, these materials will be beneficial.
• Observe and record dates of a cow’s estrous cycle.

REFERENCES:
McGraw-Hill Book Company

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THE COW’S ESTROUS CYCLE AND THE PROCESS OF FERTILIZATION
DAIRY CATTLE, LEVEL IV
Activity Sheet 7, Reproductive Definitions Worksheet

Instructions—Fill in the blanks.

The cow’s estrous cycle lasts for ____ days.

The 8- to 24-hour period that a cow will accept the bull for mating is called ______________.

If a cow conceives after mating, the heat periods __________, and the cow will not rebreed until after calving.

A cow must recover from calving before she can rebreed. This recovery period may be lengthened by stresses such as ____________.

The union of a sperm cell with an ovum is called ____________.

Before sperm cells can fertilize an egg, the cells must undergo a period of maturation called ____________.

The process of egg release is called ____________.

The egg is released from a structure called the ____________.

Once ovulation occurs, the egg is captured by the ____________ and is swept into the ____________. 
THE COW’S ESTROUS CYCLE AND THE PROCESS OF FERTILIZATION
DAIRY CATTLE, LEVEL IV
Leader’s Key, Activity Sheet 7, Reproductive Definitions Worksheet

Instructions—Fill in the blanks.

The cow’s estrous cycle lasts for 21 days.

The 8-24 hour period that a cow will accept the bull for mating is called the heat period.

If a cow conceives after mating, the heat periods stop, and the cow will not rebreed until after calving.

A cow must recover from calving before she can rebreed. This recovery period may be lengthened by stresses such as poor nutrition.

The union of a sperm cell with an ovum is called fertilization.

Before sperm cells can fertilize an egg, the cells must undergo a period of maturation called capacitation.

The process of egg release is called ovulation.

The egg is released from a structure called the ovary.

Once ovulation occurs, the egg is captured by the infundibulum and is swept into the oviduct.
THE COW’S ESTROUS CYCLE AND THE PROCESS OF FERTILIZATION
DAIRY CATTLE, LEVEL IV
Member Handout 15, Major Reproductive Organs of the Cow
Artificial Insemination (AI)—a technique used by most dairies. Semen is placed in the uterine body by passing the vagina and cervix.

Capacitation—maturation period that sperm cells must undergo after they enter the female reproductive tract. Only capacitated sperm cells can fertilize eggs.

Cervix—portion of the female reproductive tract that can sift or sort sperm cells based on physical character (normal versus abnormal). It also secretes a heavy mucus which plugs the reproductive tract during pregnancy to protect the embryo.

Conceive—term to indicate that fertilization has occurred.

Estrous cycle—time elapsed between two heat periods (estrus). Average length for the cow is 21 days.

Fertilization—the union of one sperm cell with an ovum (egg).

Follicle—clear, blister-like structure on the ovary which contains the ovum or egg.

Heat—period of sexual receptivity (also called estrus) lasting about 8 to 24 hours. It is during this period when a cow will accept the bull for mating. These periods occur at 21-day intervals. If fertilization occurs, heat periods stop and the cow will not rebreed until after calving.

Hormone—chemical substance produced by a gland. These chemicals affect the function of some organ other than the gland where produced.

Infundibulum—cup-like structure that captures the egg after it is released from the follicle.

Ovary—female reproductive gland which produces eggs and hormones for reproduction. A comparable structure in the male is the testicle.

Oviduct—long slender tube of the reproductive tract where fertilization occurs. Acts as a transport for sperm cells and the embryo from the site of fertilization to the uterus.

Ovulation—the process of egg release from a follicle on the ovary.

Ovum—another name for the egg.

Semen—sperm-rich reproductive fluid from the male.

Vagina—a portion of the female reproductive organ which acts as the receptive chamber for the male reproductive organ during mating.
Pregnancy Detection

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• Parts of the female reproductive tract
• The procedure for palpating for pregnancy
• Why detecting pregnancy accurately is important to the dairy cattle producer

ABOUT THEMSELVES:
• Importance of planning ahead for major decisions

Materials Needed:
• Plastic or rubber gloves
• Lubricant—liquid soap, mineral oil, Vaseline, etc.
• Member Handout 17, Working Chute
• Member Handout 18, Major Reproduction Organs
• Member Handout 19, Beginning Palpation Procedures
• Member Handout 20, 45-Day Pregnancy
• Member Handout 21, 90-Day Pregnancy
• Member Handout 22, 150-Day Pregnancy
• Member Handout 23, 210-Day Pregnancy
• Flip chart or writing surface

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

In an effort to make a profit, dairy farmers must strive for a freshening interval in their herds of about 365 to 375 days. Dairy cows should freshen about every 12 months for maximum production efficiency, because they will be at a high production level most of their lifetime. The dairy farmer will have more replacement heifers to bring into the herd if non-pregnant cows are culled from the herd. Being able to identify the non-pregnant cow is important in managing reproduction in a dairy herd.

The pregnancy detection procedure should be inexpensive and highly accurate. One way that dairy farmers can check for pregnancy is to observe signs of estrus (heat) after breeding. The problem associated with estrus detection as a pregnancy detection procedure is that it is very time-consuming and not very accurate. Pregnancy detection by palpation is more accurate.

Leader Notes

Ask members to list on a flip chart why pregnancy detection is important and how the results are used by dairy producers.
Anybody can learn the proper technique of palpating for pregnancy but it requires experience, practice, and a thorough knowledge of the cow’s reproductive system.

The secret to accurate pregnancy detection by palpation is practice. Once the basic procedure and technique is learned, practice is necessary to become accurate and efficient at pregnancy detection.

**FACILITIES AND SUPPLIES**

Facilities are very important when checking for pregnancy. It is important for cattle not to develop an uncomfortable attitude toward the working facilities. The facilities used for palpation are very similar to those used for artificial insemination. On most dairies, the same facilities are used for both activities.

A working chute long enough to hold a minimum of three cows is necessary. The most time consuming activity during pregnancy detection is getting the cows into the chute. Therefore, having three or more cows in a working chute or alley reduces that time frame.

A gate should be located in the working chute just behind the cow that is to be palpated. This may at first seem like a luxury item. It, however, doesn’t take very long at climbing a fence to change one’s mind. This gate should swing all the way across the alley and latch securely. This prevents cows from coming up behind the palpator and possibly causing an injury.

The working chute should be wide enough so the cattle can stand normally and quietly. A head gate is not necessary; however, a bar behind the cow to hold her in the working chute is. Cutting gates can be arranged according to one’s needs for cow separations.

Safety precautions are necessary for both the palpator and the cow. To protect the palpator, it is necessary to have a bar or chain behind the cow that is to be palpated. A gate in front of the next cow that is to be palpated is also an important safety item. Protection of the cow includes keeping chutes in good repair and restraining cows so they cannot jump out, turn around or turn over. A dirt floor in the working chute and protective shade are also safety considerations.

The only supplies needed for the pregnancy detection process are plastic sleeves and a lubricant. The plastic sleeves are relatively inexpensive, and they protect the palpator’s arm and hand against disease and eliminate irritation to the arm. A new plastic sleeve should be used on every cow to reduce the spreading of disease.

Many different lubricants can be used. Liquid soap, mineral oil, KY Jelly and Vaseline are just a few. Mild liquid soap, should be diluted with water, making it a good, inexpensive lubricant.
The purpose of a lubricant is to make the entry through the anus into the rectum as easy as possible without discomfort to the animal or palpator.

REPRODUCTIVE TRACT
To determine pregnancy accurately, the palpator must insert his/her hand into the cow’s rectum, locate the reproductive tract through the rectal wall, and determine whether pregnancy exists. Since the procedure is performed using only the sense of touch, the palpator must know where all the reproductive organs are located and how they feel at different stages of pregnancy.

Vulva—The vulva is the external portion of the female reproductive tract and consists of two lips or labia. The vulva serves as the entrance to the internal organs and also allows for passage of urine.

Vestibule—The vestibule is the general passageway to the urinary and reproductive tracts. It extends inward from the vulva for about 4 inches to where the urethra opens into its ventral surface from the bladder.

Vagina—The vagina is the tube that lies between the vestibule and the cervix. The bull deposits sperm in the vagina during mating. The vagina is normally 12 inches long.

Cervix—The cervix is the organ that separates the vagina from the uterus. It is composed primarily of connective tissue with longitudinal folds or annular rings. The cervix’s primary function is to prevent unwanted organisms and substances from entering the uterus. During estrus, however, it dilates and produces large amounts of mucous (clear discharge). The cervix is usually about 3 inches long, but its size may vary with age and breed. For example, a heifer usually has a smaller cervix than a mature cow. The cervix is an important organ in palpation and is usually easy to locate because it has a hard, gristly feel.

Uterus—The uterus lies on the floor of the pelvis directly in front of the cervix. The uterus consists of a body and two uterine horns that coil downward. The uterus contains the fetus during pregnancy. It has two layers—a muscular inner layer and a mucosal lining. From the mucosal lining protrude about 70 to 120 structures called caruncles that allow for attachment by the fetal membranes during pregnancy. The location and feel of the uterus will depend upon the stage of pregnancy and the age of the cow.

Oviducts—Two small tubes that extend from the uterine horns to the ovaries are called the oviducts. At the end of each oviduct a funnel-like structure is present that partially surrounds the ovary and receives the egg. Fertilization normally occurs in the oviduct.

Ovaries—The ovaries are the oval or almond-shaped organs at the ends of the oviducts that release eggs and secrete hormones. Each ovary consists of an inner segment and an outer segment. The inner segment is com-

ACTIVITY

Leader Notes

Pass out Member Handout 18, Major Reproductive Organs, and show where hand enters and the reproductive tract the palpator will be feeling.

Point out parts of reproductive tract as they are discussed. This will be a review from a previous lesson; however, the descriptions of the various parts are more detailed to allow for more in-depth learning if desired.
Posed of blood vessels, nerves and connective tissue; the outer segment is the site of the primordial follicles, which are the immature eggs surrounded by a layer of cells. The ovaries are suspended in the body cavity by ligaments attached to the top of the abdominal cavity. In a cow they are about ½-inch wide and ¾-inch deep, and 1 inch long and should feel firm.

**PALPATION PROCEDURE**

As the cow is being restrained in the working chute, the palpator should be preparing to palpate.

1. Remove all jewelry, watch, etc., to minimize the risk of tearing the rectum lining. Put the sleeve on—Either hand may be used, but many palpators use their left hand. The sleeves, however, are interchangeable. The sleeve is put on and pulled all the way to the shoulder. A rubber band can be placed around the upper arm to help hold the sleeve in place. Lubricant is squeezed on to the front and back sections of the gloved hand up the sleeve.

2. Make a wedge-shape with the covered, lubricated hand by bringing the fingers together and push hand into the anus and rectum. The free hand may be used to grasp the tail for leverage. As the hand goes through the anus, form a fist to push aside fecal matter and straighten the folds of the rectum. The palpator’s arm should be in the rectum about elbow deep. With arm in elbow deep, the cow’s rectum will usually relax. The hand is then opened and the search for the reproductive tract begins.

Rectal contractions may occur which may make palpation very difficult. These contractions will subside. These contractions should not be fought, but should be allowed to pass.

Puncturing the rectum rarely occurs, but it can happen. Many times following palpation, blood is observed on the gloved hand. This is due to the lining of the rectum being damaged. There is no cause for great alarm; however, special attention is always required in carefully manipulating the rectum.

3. Once the arm is in the rectum about elbow deep, feel downward—not forward. The rumen and kidneys are located forward and can be palpated but will not help in the determination of pregnancy.

The open and early pregnant uterus will be located on the floor of the pelvis. The pelvis, which is bone, will not move and is a good beginning point of identification immediately after entering the rectum. As pregnancy progresses, the uterus will become larger and drop over the edge of the pelvic rim or girdle.

The other landmark to locate inside the cow is the cervix. The cervix is a gristle-like structure which resembles the feel of a turkey neck. Unlike the...
DETERMINING STAGES OF PREGNANCY

Non-Pregnant Stage
A non-pregnant reproductive tract of a heifer is much different from a non-pregnant reproductive tract of a cow. A heifer’s non-pregnant tract will usually be located within the pelvis and be rather small. Sometimes the reproductive tract of a heifer is not located on the floor of the pelvis but along the side wall of the pelvis. Therefore, one might have to search along the pelvic wall to find a heifer’s non-pregnant reproductive tract. The non-pregnant tract of a cow, however, is larger than that of a heifer. It is usually located on the pelvic floor and may even extend over the rim of the pelvis. Many times, it is necessary when palpating a cow’s extended reproductive tract to actually pick it up and pull it toward you to determine pregnancy. When palpating the non-pregnant uterus there will be an absence of embryonic fluid and tissue.

45 Days Pregnant
Extreme caution must be used when palpating a cow or heifer that might be less than 45 days pregnant. Too much handling of the fetal tissue might cause the fetus to abort. This stage of pregnancy, therefore, requires additional palpation experience. The location of the uterus that contains a 45-day-old fetus will be approximately the same location as a non-pregnant uterus. A slight enlargement of one uterine horn, however, can be determined. A fluid-filled feeling is also noticeable. This is because after the fertilized ovum has moved into the uterine horn and begun to develop, it is surrounded by a sac filled with fluid. This sac causes an enlarged area in the horn. It is called the embryonic vesicle. Once skills have been developed at palpating a 45-day pregnancy, you can also feel the fetal membranes by slipping them through the fingers. The fetus at this stage is only 1 inch long.

90 Days Pregnant
The uterus will be located over the pelvic rim due to the increase in fluid and fetal weight. The fetus is about 6½ inches long or about the size of a rat. At this stage of pregnancy, the palpatator must locate other clues other than the fetus itself to determine pregnancy. The displacement of the uterus is one clue that would indicate pregnancy. A second clue to determine pregnancy at this stage is the presence of cotyledons. Cotyledons are ⅜ to 1 inch in diameter and are the connection between the fetal tissue and the uterine tissue. A palpator must reach down over the pelvic rim to locate the cotyledons. They will feel much like marbles. The cotyledons on the fetal membrane attach themselves to the caruncles that line the uterus.

The caruncles serve as waste and nutrient exchange between the fetus and the cow. The uterine artery is the main blood supply from the cow to the developing fetus.
Leader Notes

ACTIVITY

150 Days Pregnant
The uterus will be very heavy and pulled deep into the abdominal cavity. The cervix will be located at the rim of the pelvis. The fetus will be 12 to 16 inches long (about the size of a cat) and very difficult to reach. The cotyledons, however, will be larger and easier to locate. Once again, the palpator must reach downward over the pelvic rim to palpate the cotyledons.

200 Days Pregnant
At this stage of pregnancy the fetus may be large enough to palpate. The fetus can be as large as 24 to 32 inches long. The cervix at this point of pregnancy may be bent over the pelvic rim.

SUMMARY
Anybody with the desire to learn the technique of pregnancy detection can do so. The ability to determine pregnancy in cows is not limited to one’s age or background. One does need, however, the initial training in pregnancy determination to learn the basic ideas. Once that has been achieved, practice is what makes an individual good at palpating cows for pregnancy. Pregnancy testing cows by palpation is an inexpensive, highly accurate procedure that can be conducted at the dairy by qualified personnel.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What facilities and supplies are needed for pregnancy checking cows? List and discuss why they are needed.

2. What safety precautions should be used during pregnancy checking?

Process:
3. Why is knowledge of the anatomy of the bovine reproductive tract necessary for pregnancy detection?

4. Why is early pregnancy detection important in dairy production?

5. What might be the pitfalls of assuming, but not proving, pregnancy in a heifer?

Generalize:
6. What are the economic consequences of using pregnancy detection? Of not using pregnancy detection?

Apply:
7. If you or your family own a dairy herd, how will what you have learned help in future management?

8. Why is it important to plan ahead for major decisions?
GOING FURTHER:

- Observe pregnancy testing demonstration.
- Receive further instruction and training and learn technique of palpation for pregnancy.
- Use breeding records as an aid in pregnancy diagnosis.
- Accompany and work with someone who is pregnancy detecting cattle.

REFERENCES:


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PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 17, Working Chute
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 18, Major Reproductive Organs
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 19, Beginning Palpation Procedures

- PELVIS
- RECTUM
- OVARIES
- UTERINE HORNS

INSERTING HAND INTO RECTUM
PUSHING FECAL MATTER ASIDE
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 20, 45-Day Pregnancy

PELVIS
CORPUS LUTEUM
CARUNCLES
(cotyledons have attached)
EMBRYONIC VESICLE

RUMEN
COTYLEDONS
FETUS (1" long)
EMBRYONIC VESICLE
(1½" diameter, 24" long)

ABDOMINAL CAVITY

RECTUM
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 21, 90-Day Pregnancy

PELVIS

CORPUS LUTEUM

CARUNCLES
(cotyledons have attached)

EMBRYONIC VESICLE

RUMEN

COTYLEDONS
(3/4" diameter)

FETUS
(6 1/2" long)

EMBRYONIC VESICLE

ABDOMINAL CAVITY

RECTUM

PELVIS
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 22, 150-Day Pregnancy

PELVIS
CORPUS LUTEUM
CARUNCLES (cotyledons have attached)
COTYLEDONS (2–2½” diameter)
EMBRYONIC VESICLE
RUMEN
FETUS (16” long)
EMBRYONIC VESICLE
ABDOMINAL CAVITY
RECTUM
PREGNANCY DETECTION
DAIRY CATTLE, LEVEL IV
Member Handout 23, 210-Day Pregnancy

- Corpus Luteum
- Urinary Artery (1/2"–3/4" diameter)
- Fetus (24"–38" long)
- Abdominal Cavity
- Rumen
- Pelvis
- Rectum
Assisting in Difficult Births

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• To recognize the normal calving process
• When a cow or heifer may be experiencing a difficult birth
• How to assist a cow or heifer during a difficult birth
• To identify management practices that reduce calving problems

ABOUT THEMSELVES:
• Importance of understanding the birth process
• The value of being prepared for potential emergencies

Materials Needed:
• Member Handout 24, Birth Definitions
• Member Handout 25, Birth Presentations
• Activity Sheet 8, Difficult Births
• Leader’s Key, Activity Sheet 8, Difficult Births
• Calf puller
• Obstetrical chains

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Difficult births (dystocia) in the dairy industry are not a major problem, as 82 percent of the dairy calf births are normal with only 18 percent needing assistance. Of those needing assistance, dairy heifers calving at 2 years of age experience difficulties much more frequently than do mature cows (approximately 45 percent versus 5 percent). Most dystocia is due to high birth weight of the calf and/or small pelvic area of the dam. Injuries received during difficult birthing may cause death of the calf which will reduce both the calf crop and the profit margin.

In order to decrease calf and cow losses from dystocia, producers must be able to decide when, what, and how assistance is to be given, or if a veterinarian needs to be contacted to perform a Cesarean section. Attempting to aid the cow at the wrong time with the wrong equipment may be just as harmful as not helping a cow with a simple dystocia problem.

THE NORMAL CALVING PROCESS
The member must be able to recognize the normal calving process before he or she can recognize abnormal calving. As cows and heifers approach
Discuss each answer until everyone has a common understanding of the term.

Show illustration of normal presentation of calf, Member Handout 25, Birth Presentations.

the time of calving, the udder and abdomen become distended. The vulva becomes enlarged and flabby, and the area between the tailhead and pinbones becomes loose and sunken.

Normal birth occurs in three stages:

**STAGE 1**
The cow may show signs of uneasiness and may kick at her stomach. She is alert and may otherwise behave normally. The uterine muscles begin to contract about once every 15 minutes, which starts the birth process and also dilates (enlarges) the cervix. These uterine contractions will become more frequent and more intense as labor progresses. The calf is usually right side up, forelegs in the birth canal, with its head resting between legs. The first stage lasts 2 to 3 hours in a cow, and 4 to 6 hours in a heifer. Appearance of the feet or a water sac in the vulva marks the beginning of stage two, and ordinarily birth will occur within 30 minutes to 4 hours later. If a cow is moved or excited during the first two stages, she may delay calving.

**STAGE 2**
Stage two of labor (the delivery stage) is more intense. It may last up to four hours or longer in heifers. The cow becomes unaware of her surroundings and concentrates on uterine contractions. This stage begins with the movement of the calf’s head into the birth canal. Each uterine contraction forces the head into the cervix, and will complete the dilation of the cervix. The cow may be lying or standing, but she will be straining for prolonged periods in her efforts to push the head of the calf through the birth canal. Once the feet and legs appear, do not hurry the process and chance tearing the vulva. Extra time is required to dilate and stretch the tissues of the vulva. The calf’s life is not in danger, and it can survive for several hours if delivery does not progress beyond this point. However, calving should be completed within two to three hours once the feet or water sac first appear.

After the head appears, the rest of the calf’s body is generally passed quickly without much effort. Mucus and fluid will flow from the calf’s mouth and nostrils, cleaning the respiratory passages for normal breathing. Within an hour, the calf should be standing and licked dry by the cow. It is necessary for the calf to suckle the cow or be bottle fed shortly after birth to receive colostrum (first milk) that is rich in nutrients and antibodies.

**STAGE 3**
Also called the membrane expulsion stage, stage three is the final stage of labor where fetal membranes are passed. These tissues should be passed within 12 hours after birth.

If retained for longer than 12 hours, infection may occur and treatment may be required.
A careful examination of the cow is probably the most critical step in assisted deliveries. Care should be taken to be as sanitary as possible and to use liberal amounts of lubricant with a plastic sleeve. An examination should be made if no progress is evident for 2 to 3 hours after appearance of water sac or feet.

First examine the cervix. If the cervix is not dilated, either you are interfering too soon, or there may be a more serious problem requiring professional help. The cervix begins dilation from the inside out, and at complete dilation, the cervix is 6 to 7 inches wide.

Next, check for signs of life in the unborn calf. If alive, pinching or pulling the leg, eye, mouth, or anus will elicit movement. Absence of vital signs, sloughing of hair and/or foul odors may indicate a dead calf.

Finally, determine the presentation, position and posture of the calf. In many situations, the calf can be rearranged in the uterus, and delivery can take place without force. When manipulating a calf to a more desirable position prior to pulling, move the calf between contractions and rest during the contractions. Pulling a calf should only occur when the calf is in a normal presentation (forward or backward), posture and position.

Never use excessive force. Forcing a large calf through a small pelvis generally results in death of the calf and injury, paralysis or death of the cow. The only safe procedure for removal of a calf too large for the pelvic opening is Cesarean section (Refer to figures 1 through 8 for specific abnormal presentations).

If assistance is required, first attach obstetrical chains to the calf’s front legs. Use a double loop on each leg positioned so that one pulls from the back, not the front of the legs. Never use fence stretchers, tractors, trucks, or other brutal extremes of force. A mechanical calf puller is the only safe method.

Traction on the calf in early stages of assistance should always be straight backward when the calf has entered the birth canal, and then downward once the calf begins passing through the birth canal.

If the pelvic opening is small, pull alternately on each leg to allow the shoulders of the calf to pass through separately. Pull or apply pressure during a contraction, and rest between contractions.

Occasionally, the hips of a calf encounter difficulty passing through the pelvis (called hiplock). Rotate the calf’s body slightly to get a different angle for the hips to pass through the pelvis.
List Dystocia Management Tips
—Check heifers 3 to 4 times daily
—Give assistance when needed
—Meet nutritional demands of growing heifers
—Select A.I. service sires which have been proven for calving ease.

Pass out Activity Sheet 8, Difficult Births as a review.

ASSISTANCE POST DELIVERY
Once the calf is on the ground, make sure its nostrils and mouth are cleared of mucus or fluid and the calf is breathing normally. If the calf continues to have trouble breathing, lift it by the rear legs and shake or swing back and forth. Mouth to nostril respiration may be used if all else fails.

The fetal membranes are usually expelled by the cow within 12 hours. DO NOT manually remove the placenta. If the placenta is retained and/or an infection develops, treatment by a veterinarian may be required. Retained placentas occur even in well-managed herds.

MANAGEMENT TO DECREASE DYSTOCCIA
Dystocia in first-calf heifers is related to the growth and development of the heifers. Dairy heifers can easily be grown to calve without serious difficulties by the time they are 23 to 24 months of age. Large breed heifers need to grow at the rate of 1.75 pounds per day and small breed heifers at 1.4 pounds per day in order to have adequate size at 24 months of age. The key is to maintain a constant rate of growth. Higher rates of growth in late gestation can cause dystocia because the unborn calf is growing too fast. In addition, dystocia may be reduced by selecting AI proven calving ease sires for use on virgin heifers.

SUMMARY
It is often difficult to decide exactly when to give assistance during calving. Knowing the normal birth process and being aware of the causes of dystocia (difficult calving) is a necessary first step in making these decisions.

It is also important to realize that attempting to aid a cow at the wrong time with the wrong equipment may be just as harmful as not helping.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. How did your group choose to describe the normal calving process? Why?
2. What are the indications of a difficult birth?
3. What experiences have you had in delivering calves?

Process:
4. What steps can you take to be prepared for calving difficulties?
5. What symptoms might indicate that assistance from you or a veterinarian might be needed?
6. What are some ways to prevent calving difficulties before heifers are bred?
Generalize:
7. What resources are available to you if you encounter a difficult situation?

8. How do you plan for emergency situations?

Apply:
9. What have you learned from this lesson that will help you in future emergency situations?

GOING FURTHER:
• Visit a large animal veterinary clinic that routinely handles dystocia problems. Equipment used, stalls, lubricants, sleeves, etc., would be of interest to see and touch.
• Visit dairies where special attention is given to heifers and/or cows during calving. Facilities, equipment and management practices should be noted.
• Observe a normal calving process.
### ASSISTING IN DIFFICULT BIRTHS

<table>
<thead>
<tr>
<th>Leader Notes</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>REFERENCES:</strong></td>
</tr>
<tr>
<td></td>
<td>Kansas Beef Cattle Handbook</td>
</tr>
<tr>
<td>Author:</td>
<td>Gary E. Sides, Extension Livestock Specialist, Texas</td>
</tr>
<tr>
<td>Edited by:</td>
<td>Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University</td>
</tr>
<tr>
<td></td>
<td>James P. Adams, Extension Specialist, 4-H and Youth Programs, Kansas State University</td>
</tr>
<tr>
<td>Reviewed by:</td>
<td>James R. Dunham, Professor Emeritus, Dairy Science, Kansas State University</td>
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*90–Dairy Cattle, Level IV*
ASSISTING IN DIFFICULT BIRTHS
DAIRY CATTLE, LEVEL IV
Member Handout 24, Birth Definitions

1. **Dystocia**—difficult or prolonged labor. In cattle, caused by large birth weight, small pelvic area, and/or abnormal presentation, mainly seen in heifers.

2. **Cesarean section**—surgical removal of a fetus.

3. **Vulva**—exterior opening of the female reproductive tract.

4. **Uterus**—major part of the reproductive tract of the female. Area where the fetus grows and develops.

5. **Cervix**—portion of the female reproductive tract that connects the vagina and vulva to the uterus, and secretes a heavy mucus which plugs the reproductive tract during pregnancy to protect the embryo and fetus from germs.

6. **Vagina**—a portion of the female reproductive tract which acts as the receptive chamber for the penis during mating.

7. **Ovary**—female reproductive gland which produces eggs and hormones for reproduction. The comparable structure in the male is the testicle.

8. **Uterine contractions**—contractions of the smooth muscles of the uterus to enlarge the cervical opening to allow passage of calf during birth.

9. **Amnion**—fetal membrane filled with fluid that immediately surrounds the fetus. The amnion protects the fetus from injury during early pregnancy. Amnionic fluid may help lubricate the birth canal.

10. **Birth canal**—part of the reproductive tract of the cow that passes through the pelvis. A small pelvis or birth canal is a major factor in dystocia.

11. **Placenta**—fetal tissues that attach to the uterus that enable the fetus to receive nutrients from the blood supply of the cow. The placenta is attached to the uterus until birth is completed and usually passes out of the cow within 12 hours after birth.

12. **Presentation of the calf**—the direction of delivery, either frontwards, backwards or crosswise.

13. **Position of calf**—how calf is lying, either upside down or right side up.

14. **Posture of calf**—the position of the head and legs of the calf.

15. **Water sac**—fetal membranes containing fluid that protrude from the vulva during labor before the calf is expelled.
ASSISTING IN DIFFICULT BIRTHS
DAIRY CATTLE, LEVEL IV
Member Handout 25, Birth Presentations

NORMAL PRESENTATION
Front feet and head first.

ABNORMAL PRESENTATION
1. Head first with one or both legs bent backwards.
2. Head and foot first with one leg crossed over the neck.
3. Front feet first with the head twisted upward and backward.
ASSISTING IN DIFFICULT BIRTHS  
DAIRY CATTLE, LEVEL IV  
Member Handout 25, Birth Presentations, continued

<table>
<thead>
<tr>
<th>ABNORMAL PRESENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong> Front feet first with the head turned down between the front legs.</td>
</tr>
<tr>
<td><strong>5</strong> Backward presentation with rear feet first.</td>
</tr>
<tr>
<td><strong>6</strong> Breech presentation—calf backwards with rear legs tucked under the body.</td>
</tr>
<tr>
<td><strong>7</strong> Calf upside down and backwards with rear legs tucked up to body.</td>
</tr>
<tr>
<td><strong>8</strong> Back of the calf is presented first.</td>
</tr>
</tbody>
</table>
ASSISTING IN DIFFICULT BIRTHS
DAIRY CATTLE, LEVEL IV
Activity Sheet 8, Difficult Births

1. Dystocia means ____________________   ____________________ .

2. The major factor responsible for calving difficulty in dairy heifers is ____________________.

3. A calf should only be pulled when in the normal____________________,
   ____________________ and ____________________ for delivery.

4. A ____________________ ____________________ is the only safe procedure for
delivery of a large calf when the pelvic opening is too small.

5. The ____________________ dilates to allow for passage of the calf.

6. An examination should be made of the cow and fetus if no progress is evident for _____
hours after appearance of the feet or fetal membranes.

7. Lack of movement by the calf and/or foul odors may indicate that the calf is
   ____________________.

8. List and define the three stages of the normal calving process.
   (a) ____________________________________________________________________
   ____________________________________________________________________
   ____________________________________________________________________  
   (b) ____________________________________________________________________
   ____________________________________________________________________
   ____________________________________________________________________  
   (c) ____________________________________________________________________
   ____________________________________________________________________

9. True or False. Selecting AI sires for calving ease may help reduce calving difficulties.
ASSISTING IN DIFFICULT BIRTHS
DAIRY CATTLE, LEVEL IV
Leader’s Key, Activity Sheet 8, Difficult Births

1. Dystocia means __________________________ difficult ____________.

2. The major factor responsible for calving difficulty in dairy heifers is large birth weight.

3. A calf should only be pulled when in the normal presentation, posture and position for delivery.

4. A Cesarean section is the only safe procedure for delivery of a large calf when the pelvic opening is too small.

5. The cervix dilates to allow for passage of the calf.

6. An examination should be made of the cow and fetus if no progress is evident for 2 to 3 hours after appearance of the feet or fetal membranes.

7. Lack of movement by the calf and/or foul odors may indicate that the calf is dead.

8. List and define the three stages of the normal calving process.
   (a) STAGE 1: Cow is uneasy, uterine contractions begin and cervix dilates. Feet or water sac in the vulva at end of stage 1.
   (b) STAGE 2: Delivery stage. Calf is born.
   (c) STAGE 3: Membrane expulsion stage. Fetal membranes are passed.

9. True or False. Selecting AI sires for calving ease may help reduce calving difficulties.
Computerized Rations—Lactating Cows
Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• To formulate a ration for lactating cows
• Compare the nutrient requirements at various production levels
• Compare the effects of various ingredients in the ration

ABOUT THEMSELVES:
• The demand for nutrients in the diet is affected by several factors
• The computer can be used to make many decisions

Materials Needed:
• A PC-compatible computer and printer
• The KSU Lactating Cow computer program
• Member Handout 26, KSU Dairy Ration—Lact-Cow

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The feeding program for a dairy herd has a great impact on its productivity and profitability. A herd that is underfed will not produce up to its potential and will be less profitable than a well-fed herd. Likewise, an overfed herd will not produce as efficiently as a herd fed a properly balanced ration.

Computer programs are available to conveniently balance rations for dairy cattle. Rations may be formulated by hand calculations but this process is quite laborious, and it is difficult to evaluate the economic value of certain ingredients without the use of a computer. This lesson will give the members the opportunity to formulate rations for lactating dairy cows by computer. Another lesson may be used as a follow up to evaluate the value of ingredients by computer.

To run the program: At A:\ type RUN LACT-COW <enter>. The cell pointer will come to the space to enter the name, after which, press <enter>. The cell pointer will then be located at the space for the address which will be entered after pressing <enter>.

The location of the cell pointer is designated by the letter at the head of the column and the row number on the left margin of the worksheet. Example, the location of the age is at C4.

Leader Notes

The Lactating Cow computer program should be ordered from K-State Research and Extension Dairy prior to the meeting. When ordering the program, please send a formatted diskette and request the Baled version of the Lactating Cow program.

Run a sample ration before showing members.

Consult your county agent, a dairy specialist or a nutritionist for detailed explanations of reports.

Show members how to run a sample ration. Use Member Handout 26, KSU Dairy Ration—Lact-Cow, or your sample printout to explain the results, meaning and significance.
The following are suggested guides for inputs:

**Age (C4)**—enter 3 yr for an entire herd. If first lactation heifers are fed separately, enter heifers at 2 yr and the older group at 4 yr.

**Body weight (D4)**—enter the group average body weight.

**Milk/day (E4)**—Enter 30% above daily average.

**Fat % (F4)**—enter the herd average fat test.

**Protein % (G4)**—enter the herd average protein test.

**ECM**—energy corrected milk. This standardized value is calculated using the desired pounds of milk, % fat and % protein. This value is used to eliminate calculating all the possible combinations of the three components.

Feed codes are shown in a table beginning at K3. Enter the code number of feeds selected in column A by typing the code number over an existing number. The nutrient content of the feeds will be shown when an amount of the feed is entered in column C. If the nutrient content for a feed is different than that shown, type the value over the existing value and press <enter>. Note: percentages must be entered as decimals.

Forages (A9)—Total forage dry matter intake as a percentage of body weight should be about 1.6% for early lactation cows, 1.8% for mid lactation cows, and 2.0% for late lactation cows. The rate of forage dry matter intake should be about 1.8% for the entire lactating herd. One forage may be fed free choice by entering 0.1 pound at C12. The amount of forage estimated to be consumed free choice is shown at C13.

**Top dress (A15)**—any feed fed on the bunk should be reported here as a top dress.

**Grains (A22)**—enter the ratio of grains to be used in the grain mix.

**Protein supplements (A27)**—enter the ratio of protein supplements to be included in the grain mix.

**Phosphorus supplement (G30)**—a mineral supplement containing phosphorus must be entered. If the phosphorus supplement contains calcium, enter the calcium percentage at H30.

**Calcium supplement (G31)**—a mineral supplement containing calcium must be entered. If only one supplement containing calcium and phosphorus is fed, enter the calcium percentage.

**Vitamin premix (E32)**—the vitamin A content of a vitamin premix is entered in thousands of units.
Output—the amounts of each ingredient needed in the grain mix is shown beginning at D42.

Ration specifications (B54)—the following are some suggested guides.

Dry matter intake (D55)—in most cases should not exceed 4.2% of body weight, since this is the maximum that most cows could eat.

NDF intake (B57)—the minimum Neutral Detergent Fiber (NDF) content of the ration should be at least 27%. If the NDF content is less than 27%, an error will be shown at D57. This amount of fiber is needed for a balanced ration.

UIP % (B59)—the Undegraded Intake Protein (UIP) should be in the range of 35% to 40%. If the UIP percentage is outside this range, select different protein supplements. This level is needed to avoid accumulation of ammonia in the rumen and to provide adequate protein for rumen microbial growth.

To Exit—Press /QY.

Let each member run their own ration on the computer. Then, run their rations using different milk production levels.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What problems did you encounter while running the program?
2. Did you think the program was “user friendly?” Why or why not?

Process:
3. Why is it so necessary for lactating cows to have a balanced diet?
4. What difference did it make when you adjusted the milk production levels? To what point does a better diet account for more milk? Less milk?

Generalize:
5. How does a balanced diet affect your performance?
6. How do your activities dictate your diet?

Apply:
7. What do you use a computer for in your life? How would you accomplish these tasks without a computer?
GOING FURTHER:
- Try selecting different ingredients for a lactating cow ration to determine the effects on the grain mix needed.
- Use low quality forage as the input for forages to illustrate the additional requirements for a grain mix.

REFERENCES:

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

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100–Dairy Cattle, Level IV
### COMPUTERIZED RATIONS—LACTATING COWS

**DAIRY CATTLE, LEVEL IV**

**Member Handout 26, KSU Dairy Ration—Lact-Cow**

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<thead>
<tr>
<th>DATA INPUT</th>
<th>Age-yrs</th>
<th>Body-wt</th>
<th>Milk/day</th>
<th>Fat%</th>
<th>Prot %</th>
<th>ECM</th>
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<tbody>
<tr>
<td>Animal Data</td>
<td>3.00</td>
<td>1,300</td>
<td>75.0</td>
<td>3.75</td>
<td>3.20</td>
<td>77.7</td>
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Enter Feed Codes from Table Beginning @ L3.

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<th>FORAGES</th>
<th>Lbs/day</th>
<th>--DM%--</th>
<th>--NEL--</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa Hay</td>
<td>10.0</td>
<td>90.0%</td>
<td>0.60</td>
<td>19.7%</td>
<td>0.75%</td>
<td>0.26%</td>
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<tr>
<td>Corn Silage</td>
<td>14</td>
<td>33.0%</td>
<td>0.70</td>
<td>8.4%</td>
<td>0.34%</td>
<td>0.20%</td>
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<tr>
<td>Cottonseeds with</td>
<td>6.0</td>
<td>90.0%</td>
<td>1.04</td>
<td>22.0%</td>
<td>0.21%</td>
<td>0.64%</td>
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<tr>
<td>Soybeans</td>
<td>22</td>
<td>Fat</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Grain Mix</td>
<td>27</td>
<td></td>
<td></td>
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<tr>
<td>Soy Hulls</td>
<td>47</td>
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<thead>
<tr>
<th>GRAINS</th>
<th>--Ratio----</th>
<th>--DM%--</th>
<th>--NEL--</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
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</thead>
<tbody>
<tr>
<td>Milo</td>
<td>32</td>
<td>88.0%</td>
<td>0.92</td>
<td>10.0%</td>
<td>0.03%</td>
<td>0.31%</td>
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<tr>
<td>Shelled Corn</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<table>
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<tr>
<th>PROTEIN SUPPLEMENT</th>
<th>--Ratio----</th>
<th>--DM%--</th>
<th>--NEL--</th>
<th>Prot %</th>
<th>--CA%--</th>
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<tbody>
<tr>
<td>Corn Glut Meal-61</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean Meal-Sol</td>
<td>50</td>
<td>89.0%</td>
<td>0.88</td>
<td>49.9%</td>
<td>0.30%</td>
<td>0.68%</td>
</tr>
</tbody>
</table>

| PHOSPHORUS SUPPLEMENT | (enter % CA & P) | 23.0% | 18.0% |
| Calcium Supplement | (enter % CA) | 38.0% |

| VITAMIN PREMIX | A units/lb (1,000) | 1000 |

**DATA OUTPUT** (solved for NEL, Protein, Ca, P, Vitamins A)

<table>
<thead>
<tr>
<th>Nutrients needed/day-</th>
<th>--DM-----</th>
<th>--NEL----</th>
<th>Prot--</th>
<th>--Ca--</th>
<th>--P--</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forages/day----------</td>
<td>49.08</td>
<td>39.13</td>
<td>8.85</td>
<td>0.52</td>
<td>0.24</td>
</tr>
<tr>
<td>Forage Dry Matter Intake</td>
<td>23.02</td>
<td>15.38</td>
<td>2.97</td>
<td>0.12</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**GRAIN MIX INGREDIENTS**

<table>
<thead>
<tr>
<th>DRY</th>
<th>AP-basis % of Mix</th>
<th>TON</th>
<th>2 TON</th>
<th>5 TON</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOYBEAN MEAL-SOL</td>
<td>6.74</td>
<td>7.57</td>
<td>30.93%</td>
<td>619</td>
</tr>
<tr>
<td>Shelled Corn</td>
<td>13.27</td>
<td>15.08</td>
<td>61.59%</td>
<td>1232</td>
</tr>
<tr>
<td>-lbs Phos Supp.</td>
<td>0.38</td>
<td>1.56%</td>
<td>31</td>
<td>63</td>
</tr>
<tr>
<td>-lbs Ca Supp.</td>
<td>0.73</td>
<td>2.96%</td>
<td>59</td>
<td>119</td>
</tr>
<tr>
<td>-lbs Bicarb</td>
<td>0.37</td>
<td>1.50%</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>-lbs Mag Oxide</td>
<td>0.18</td>
<td>0.75%</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>-lbs T M Salt</td>
<td>0.11</td>
<td>0.45%</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>-lbs Vit Premix</td>
<td>0.06</td>
<td>0.25%</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

**RATION SPECIFICATIONS**

| DM Intake | --(lb) | 50.3 | Grain Mix | --(lb) | 24.5 |
| DM Intake- | (%BW) | 3.9 | Grain Mix + Top | 30.5 |
| NDF-(lb/body cwt) | 1.2 | 54.2 |
| NDF- (% of DM) | 31.2 | 19.2 |
| Protein- (% of DM) | 17.6 | 21.5 |
| U1P- (% of Prot) | 35.9 | 0.83 |
| NEL- (Mcal/lb DM) | 0.78 | 1.78 |
| Calcium- (% of DM) | 1.03 | 0.71 |
| Phos- (% of DM) | 0.48 | 5.11 |

AF = As Fed; BW = Body Weight; ECM = Energy Corrected Milk; NDF = Neutral Detergent Fiber
What Members Will Learn . . .

ABOUT THE PROJECT:
- The importance of body condition score for high levels of milk production
- How to determine body condition score

ABOUT THEMSELVES:
- The importance of management tools in their lives

Materials Needed:
- Dairy cows for body condition score evaluation
- Member Handout 27, Body Condition Score

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Body Condition Score (BCS) is a good indicator of the amount of energy stored in a cow’s body. A good reserve of energy is needed when cows freshen because they have more ability to produce energy in the form of milk than they have to consume energy. Therefore, fresh cows will lose body weight (energy) during early lactation in the process of converting energy to milk. If fresh cows do not have a good reserve of energy, milk production will not be as high as it could be.

High producing dairy cows will lose body weight until they can consume enough energy to exceed the requirement for milk production. In most cases, cows should be able to consume enough energy to be gaining body weight by 70 days in milk. This weight gain should continue gradually until drying off. At this time the BCS should be at least 3. Then, dry cows can gain enough weight to obtain a BCS of 4 at freshening.

It is important for dairy farmers to be aware of the body condition of their cows so that nutritional adjustments can be made as needed. A BCS system has been developed for dairy cattle using a scoring system between 1 and 5. A BCS of 1 is an emaciated cow and a score of 5 is an obese condition. Cows with a BCS of 1 do not produce up to their potential, and a BCS above 4 may lead to calving difficulties, fatty liver syndrome, and metabolic disorders. Ideally, cows should not become thinner than a BCS of 2 during early lactation or fatter than about 4 as they approach freshening.

Leader Notes

This lesson is intended to be conducted on a dairy farm where cows may be observed for BCS. Pass out Member Handout 27, Body Condition Score. Discuss the five BCS’s. Observe some live animals in different stages of lactation. Give these cows a BCS.

Remind members that after they have studied the 5 scores, they will actually score some live cows.
Leader Notes

ACTIVITY

The following are a descriptions of the BCS’s:

**BCS=1**: Deep cavity around tailhead. Bones of pelvis and short ribs sharp and easily felt. No fatty tissue in pelvic or loin area. Deep depression in loin.

**BCS=2**: Shallow cavity round tailhead with some fatty tissue lining it and covering pin bones. Pelvis easily felt. Ends of short ribs feel rounded and upper surfaces can be felt with slight pressure. Depression visible in loin area.

**BCS=3**: No cavity around tailhead and fatty tissue easily felt over whole area. Pelvis can be felt with slight pressure. Thick layer of tissue covering top of short ribs which can still be felt with pressure. Slight depression in loin area.

**BCS=4**: Folds of fatty tissue are seen around tailhead with patches of fat covering pin bones. Pelvis can be felt with firm pressure. Short ribs can no longer be felt. No depression in loin area.

**BCS=5**: Tailhead is buried in thick layer of fatty tissue. Pelvic bones cannot be felt even with firm pressure. Short ribs covered with thick layer of fatty tissue.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What was the hardest part in determining a body condition score? The easiest?

2. Did you find it easier or harder to judge live animals than pictures? Why?

**Process:**
3. What is the most important thing to look for in body condition?

4. Why is it important to determine the body condition scores for your dairy cows?

**Generalize:**
5. What are some management tools used with other livestock projects?

6. What do you use to manage your life? Why?

**Apply:**
7. What new ideas have you learned from this discussion that will help you manage better in the future? Why?

**GOING FURTHER:**
- Visit a dairy farm and evaluate the BCS of cows in various stages of their productive cycle.
REFERENCES:
Body Condition Scoring, Elanco Products Company, Indianapolis, Indiana

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

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105–Dairy Cattle, Level IV
DETERMINING BODY CONDITION SCORE
DAIRY CATTLE, LEVEL IV
Member Handout 27, Body Condition Score

BCS=1
Deep cavity around tailhead. Bones of pelvis and short ribs sharp and easily felt. No fatty tissue in pelvic or loin area. Deep depression in loin.

BCS=2
Shallow cavity around tailhead with some fatty tissue lining it and covering pin bones. Pelvis easily felt. Ends of short ribs feel rounded and upper surfaces can be felt with slight pressure. Depression visible in loin area.

BCS=3
No cavity around tailhead and fatty tissue easily felt over whole area. Pelvis can be felt with slight pressure. Thick layer of tissue covering top of short ribs which can still be felt with pressure. Slight depression in loin area.

BCS=4
Folds of fatty tissue are seen around tailhead with patches of fat covering pin bones. Pelvis can be felt with firm pressure. Short ribs can no longer be felt. No depression in loin area.

BCS=5
Tailhead is buried in thick layer of fatty tissue. Pelvic bones cannot be felt even with firm pressure. Short ribs covered with thick layer of fatty tissue.

Illustrations provided by:
Elanco Products Company,
Indianapolis, Indiana
DETERMINING BODY CONDITION SCORE
DAIRY CATTLE, LEVEL IV
Member Handout 27, Body Condition Score, continued

Illustrations provided by:
Elanco Products Company,
Indianapolis, Indiana
Computerized Rations—Dry Cows

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of good feeding programs for dry cows
• To formulate a ration for dry cows

ABOUT THEMSELVES:
• The demand for nutrients in the diet is affected by several factors
• The computer can be used to make many decisions

Materials Needed:
• A PC-compatible computer and printer
• The KSU Dry Cow computer program
• Member Handout 28, KSU Dairy Ration—Dry Cow

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The feeding program for dry cows can have a great impact on milk production in the next lactation. The dry period is the time when cows should be fed according to their body condition score (BCS). Dry cows should be fed enough nutrients to reach a BCS of about 4 by the time they freshen. Cows with this much body condition will have a reserve of energy on their bodies which can be used to produce high levels of milk during early lactation. So, dry cows’ BCS are an important factor for balancing their rations.

The mineral content of dry cow rations can affect performance in the next lactation. Dry cows fed more calcium and/or phosphorus than required tend to have milk fever at or near the time of freshening. Yet it is important to meet the requirements for these minerals during the dry period. Therefore, the calcium and phosphorus requirements need to be met but excessive amounts may cause problems.

Computer programs are available to conveniently balance rations for dry cows. Rations may be formulated by hand calculations, but this process is quite laborious. This lesson will teach members how to formulate dry cow rations by computer.

To run the program: At A:>\ type **RUN DRY-COW <enter>**. The cell pointer will come to the space to enter the name, after which, press

Leader Notes

The Dry Cow computer program should be ordered from K-State Research and Extension Dairy prior to the meeting. When ordering the program, please send a formatted diskette and request the Baled version of the Dry Cow program.

Run a sample ration before showing members.

Show members how to run a sample ration. Use Member Handout 28, KSU Dairy Ration—Dry Cow, or your sample printout to interpret results and make recommendations.
Use Member Handout 28, KSU Dairy Ration—Dry Cow. Discuss the inputs needed to balance a ration. Then, have members enter inputs for their own ration on the handout.

Let the members enter their own inputs and balance a ration.

ACTIVITY

<enter>. The cell pointer will then be located at the space for the address which will be entered after pressing <enter>. The name and address will then be shown at A2 and C2, respectively. Note, the location of the cell pointer is designated by the letter at the head of the column and the row number on the left margin of the worksheet.

Feed codes are shown in a table beginning at K3. Enter the code number of feeds selected in column A by typing the code number over an existing number. The nutrient content of the feeds will be shown when an amount of the feed is entered in column C. If the nutrient content for a feed is different than that shown, type the value over the existing value and press <enter>. **Note:** percentages must be entered as decimals.

The following are suggested guides for inputs:

**Age (D5)**—enter 3 yr for an entire group of dry cows. If the ration is being balanced for an individual dry cow, enter her age.

**Body weight (E5)**—enter the group average or individual body weight.

**Body Score (G5)**—enter the BCS average for the group or for an individual dry cow. Body condition score helps determine the amount of additional nutrients required (if any) for improving body condition during the dry period. Any score less than 4 would need additional nutrients.

**Forages (A10)**—Enter the feed codes and amounts of the forages to be fed in this section. Be sure to enter zero in the lbs/day column for forages already listed which are not going to be fed. **One forage may be fed free choice by entering 0.1 pound at C13.** The amount of that forage estimated to be consumed free choice will be shown at C14. The rate of forage dry matter intake should be about 1.6% of body weight which is shown at D37.

**Top Dress (A17)**—enter the feed codes of any feeds that are going to be fed as a top dress. The pounds of each top dress to be fed must be entered.

**Grains (A21)**—enter the feed codes of the grains that are going to be fed. The ratio of the grains to be fed in the ration must be entered in column C.

**Protein Supplement (A26)**—enter the feed code of the protein supplement to be fed.

**Phosphorus Supplement (H28)**—the phosphorus content of a mineral supplement containing phosphorus must be entered. If the mineral contains calcium, enter the calcium content at G28.
Calcium Supplement (G29)—the calcium content of a mineral supplement containing calcium must be entered.

Vitamin premix (E31)—the vitamin A content of a vitamin premix must be entered. The concentration of vitamin A is entered in 1000’s of units per pound.

Data Output (A33)—the results of the calculations are shown.

Nutrients required (A35)—shows the nutrient requirements for dry cows which has been determined by their age, body weight and BCS.

Forages provided (A36)—shows the amount of nutrients provided by forages.

Grain Mix (A39)—The amounts of each ingredient to be fed in the grain mix are shown in column E. The percentage of the ingredient in the grain mix is shown in column G and the amount in a ton in column H. The pounds of grain mix needed per cow per day are shown at H52.

Ration Specifications (C51)—this section shows various specifications about the dry cow ration that was formulated.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What was the hardest part of the computer program?
2. What are some of the advantages of using this program? Disadvantages?

Process:
3. How is the quality of the grain mix affected by the quality of the forage fed?
4. Why is it important to know how to determine a body condition score for dry cows?

Generalize:
5. What is the relationship between your diet and your performance at school or in sports, etc.?
6. How do your nutrient requirements change from one activity to another or at different times of the year?

Apply:
7. What do you plan to do differently in the future to balance your diet with your activity?
Leader Notes

ACTIVITY

GOING FURTHER:

- Select different forages for the dry cow ration to determine the effects on the grain mix requirements.
- Change the BCS to determine the affects of body condition on grain requirements.

REFERENCES:

Author:
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:
Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
## COMPUTERIZED RATIONS—DRY COWS
### DAIRY CATTLE, LEVEL IV
#### Member Handout 28, KSU Dairy Ration—Dry Cow

**SEE INSTRUCTIONS @ A95**

### DATE: 05/07/97

<table>
<thead>
<tr>
<th>DATA INPUT</th>
<th>Age-yrs</th>
<th>Body-wt</th>
<th>Body Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Data</td>
<td>3.0</td>
<td>1,350</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**SEE FEED CODES @ K3**

**ESTIMATE FORAGE DMI=1.6% OF BODY WEIGHT**

### FORAGES

<table>
<thead>
<tr>
<th></th>
<th>Lbs/day</th>
<th>--DM%--</th>
<th>--NEL---</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Brome Hay</td>
<td>10.0</td>
<td>90.0%</td>
<td>0.55</td>
<td>10.0%</td>
<td>0.30%</td>
<td>0.20%</td>
</tr>
<tr>
<td>54 Sudan Hay</td>
<td>0.1</td>
<td>90.0%</td>
<td>0.55</td>
<td>9.0%</td>
<td>0.28%</td>
<td>0.33%</td>
</tr>
</tbody>
</table>

**FREE CHOICE FORAGE**

<table>
<thead>
<tr>
<th></th>
<th>Lbs/day</th>
<th>--DM%--</th>
<th>--NEL---</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 Cottonseeds with</td>
<td>12.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 Soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GRAINS

<table>
<thead>
<tr>
<th></th>
<th>--Ratio---</th>
<th>--DM%--</th>
<th>--NEL---</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 Milo</td>
<td>100.0</td>
<td>88.0%</td>
<td>0.91</td>
<td>10.0%</td>
<td>0.03%</td>
<td>0.31%</td>
</tr>
<tr>
<td>45 Shelled Corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 Wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PROTEIN SUPPLEMENT

<table>
<thead>
<tr>
<th></th>
<th>--DM%--</th>
<th>--NEL---</th>
<th>Prot %</th>
<th>--CA%--</th>
<th>--P%--</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 SOYBEAN MEAL-SOL</td>
<td>89.0%</td>
<td>0.85</td>
<td>49.9%</td>
<td>0.30%</td>
<td>0.68%</td>
</tr>
</tbody>
</table>

### PHOSPHORUS SUPPLEMENT

<table>
<thead>
<tr>
<th></th>
<th>(enter % CA &amp; P)</th>
<th>23.0%</th>
<th>18.0%</th>
</tr>
</thead>
</table>

### CALCIUM SUPPLEMENT

<table>
<thead>
<tr>
<th></th>
<th>(enter % CA)</th>
<th>38.0%</th>
<th></th>
</tr>
</thead>
</table>

**Vitamin premix**

<table>
<thead>
<tr>
<th>A units/lb (1,000)</th>
<th>1000</th>
</tr>
</thead>
</table>

### DATA OUTPUT (solved for NEL, Protein, Ca, P, Vitamins A)

| Nutsrients required | 27.00 | 16.22 | 2.91 | 0.124 | 0.078 |
| Forages provided    | 19.65 | 10.92 | 1.88 | 0.06  | 0.05  |
| Forage Dry Matter Intake | 1.46% | Forage NDF Intake | 1.00% |

### GRAIN MIX

<table>
<thead>
<tr>
<th>SOYBEAN MEAL-SOL</th>
<th>DM-basis</th>
<th>AF-basis</th>
<th>% of Mix</th>
<th>lbs/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.11</td>
<td>1.25</td>
<td></td>
<td>18.11%</td>
<td>362</td>
</tr>
<tr>
<td>Shelled Corn</td>
<td>4.79</td>
<td>5.44</td>
<td>78.84%</td>
<td>1577</td>
</tr>
<tr>
<td>Phosphorus Supp</td>
<td>0.01</td>
<td>0.11%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Calcium Supp</td>
<td>0.16</td>
<td>2.30%</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Bicarb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mag Ox</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T M Salt</td>
<td>0.01</td>
<td>0.09%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Vit Premix</td>
<td>0.04</td>
<td>0.54%</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

### RATION SPECIFICATIONS

<table>
<thead>
<tr>
<th>DM Intake --(lb)--</th>
<th>25.8</th>
<th>Grain Mix --(lb)--</th>
<th>6.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM Intake--(%BW)--</td>
<td>1.9</td>
<td>Grain Mix + Top----</td>
<td>6.9</td>
</tr>
<tr>
<td>NDF--(lb)----------</td>
<td>14.1</td>
<td>Grain + Top (%)----</td>
<td>26.8</td>
</tr>
<tr>
<td>NDF--(% of DM)-----</td>
<td>54.9</td>
<td>Grain Prot-(%AF)--</td>
<td>15.0</td>
</tr>
<tr>
<td>Protein--(% of DM)</td>
<td>11.3</td>
<td>Grain Prot-(%DM)--</td>
<td>16.9</td>
</tr>
<tr>
<td>UIP--(% of Prot)---</td>
<td>39.3</td>
<td>Grain NEL-(DM)----</td>
<td>0.87</td>
</tr>
<tr>
<td>NEL--(Mcal/lb DM)–</td>
<td>0.63</td>
<td>Grain Ca-(%DM)----</td>
<td>1.09</td>
</tr>
<tr>
<td>Calcium--(% of DM)–</td>
<td>0.48</td>
<td>Grain Phos-(%DM)--</td>
<td>0.39</td>
</tr>
<tr>
<td>Phos--(% of DM)---</td>
<td>0.30</td>
<td>Total Ration-(AF)--</td>
<td>29.1</td>
</tr>
</tbody>
</table>
Managing Dry Cows

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of preparing dry cows for the next lactation
• Management guidelines for dry cows

ABOUT THEMSELVES:
• The importance of planning ahead

Materials Needed:
• Member Handout 29, Guide to Managing Dry Cows
• Flip charts
• Note cards

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

The dry period is an important part of a cow’s production cycle because productivity in the next lactation is affected by several dry cow management practices. During this time the mammary system naturally undergoes a process of repairing and regenerating the milk secretory tissue (involution). Good dry cow management can also replenish depleted nutrients in the cow’s body, and some mastitis can be cured. The following are some suggested guidelines for managing dry cows.

Plan ahead. If breeding dates have been recorded, then the due date for freshening, and, thus, the date to turn dry should be known. Cows should be dry 45 to 60 days. In most cases there is no advantage in having cows dry longer than 60 days. Production in the next lactation usually will be less when the dry period is less than 45 days in length.

Discontinue milking abruptly. This practice will reduce the incidence of mastitis during the early dry period. However, the udder of cows producing more than 40 pounds daily will become extremely tight, so reduce grain feeding a few days before dry-off to reduce milk flow.

Dry treat all quarters after the last milking before dry-off. Antibiotic sensitivity should be run on bulk tank milk samples every six months to determine the most effective dry cow preparation.

Observe dry cows for several days after dry-off. If one or more quarters of the udder becomes enlarged, milk out completely and repeat the dry treatment in the affected quarters.

Leader Notes

In pairs or as a group, list the steps to turn cows dry. Discuss the importance of each step.
Have members list management practices for the dry period that helps prepare cows for freshening. Discuss the importance of each practice.

Dry cows should be separated from the milking herd. They almost always need a different ration, and they may be housed with less confinement.

Dry cows should be fed according to their body condition score (Refer to the Determining Body Condition Score lesson). Dry cows should have about a body condition score of 4 when ready to freshen. Cows going dry with a body condition score less than 3 will need extra grain to regain body condition (refer to Computerized Rations—Dry Cow to determine the grain requirements).

Grass type forages are recommended for dry cows. These forages help recondition the rumen and avoid milk fever in the next lactation. Feeding mostly alfalfa predisposes dry cows to milk fever. Corn silage should be fed sparingly to dry cows to avoid the fat cow syndrome.

The dry period is a good time to consider vaccinations as a part of a preventive herd health program (refer to the Preventive Herd Health Program lesson). A local veterinarian should be consulted for recommending vaccines.

The environment for dry cows is important. They need to be kept clean and comfortable. Don’t put dry cows in a pasture with a pond. Cows may become infected with mastitis when they wade in a pond. If dry cows are kept in a lot, avoid muddy conditions that can lead to mastitis when they freshen.

As dry cows approach freshening, the ration needs to be adjusted so that the rumen is adjusted to digest the forages fed to the milking herd when they freshen. This is particularly important if ensiled forages are fed. The amount of grain fed needs to be increased up to about 1 percent of body weight to adjust the rumen for high energy rations.

Provide a clean calving area. This may be a lot with a good sod or a well-bedded maternity stall. Sanitation is the important consideration to help prevent diseases in the newborn calf and prevent mastitis in the fresh cow. Observe the cow routinely as she prepares for calving to get assistance if needed. Special attention is also needed for the first few days to observe for signs of milk fever.

The calf should be separated from the dam as soon as convenient to minimize the stress of separation. If the calf has not nursed, feed it two quarts of colostrum.

The fresh cow should be completely milked at the next milking, but observe for signs of milk fever afterwards. This reduces the chances of clinical mastitis in the recently fresh cow.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. Why is it so important to manage dry cows?
<table>
<thead>
<tr>
<th>Process:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. When do rations need to be adjusted?</td>
</tr>
<tr>
<td>3. What practices should you observe to avoid clinical mastitis?</td>
</tr>
<tr>
<td>4. When should you begin planning to manage a dry cow?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Generalize:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. What things in your life do you have to plan ahead for?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Apply:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. What are your goals for yourself two years from now? Five years? What are you doing now so that you can meet your goals in the future?</td>
</tr>
</tbody>
</table>

**GOING FURTHER:**
- Visit a dairy farm and ask the manager about feeding and management practices for dry cows.

**REFERENCES:**
- Determining Body Condition Score, Level IV, Dairy Project Leaders Notebook
- Computerized Rations—Dry Cow, Level IV, Dairy Project Leaders Notebook
- Vaccines for Dairy Cattle, Level III, Dairy Project Leaders Notebook

**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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MANAGING DRY COWS
DAIRY CATTLE, LEVEL IV
Member Handout 29, Guide to Managing Dry Cows

Turning Cows Dry:
1. Length of dry period should be 45 to 60 days
2. If cows are producing more than 40 pounds of milk daily, discontinue feeding grain a week before drying-off.
3. Discontinue milking abruptly.
4. Dry treat all quarters after the last milking at dry-off. Select dry cow treatment based upon an antibiotic sensitivity test.
5. Observe cows for several days after dry-off for signs of mastitis. If mastitis is indicated, milk out and re-treat.
6. Consult with a veterinarian for recommended vaccines during the dry period.
7. Feed grass-type forages.

Preparation for Freshening:
1. Balance the grain mix according to the Body Condition Score.
2. Adjust ration to include any ensiled forages being fed to the lactating cows plus grain mix at the rate of 1 percent of body weight two to three weeks before freshening.
3. Observe cows getting ready to calve for any sign of mastitis and treat if needed.
4. Cows should calve in a clean area, such as, a grass-sodded lot or well-bedded maternity stall.
5. Observe cows at calving time in case assistance is required.

Beginning Lactation:
1. Separate calf from cow soon after calving. Make sure calf received 2 quarts of colostrum as soon as convenient.
2. Fresh cows should be milked-out completely.
3. Observe fresh cows for symptoms of milk fever and other metabolic disorders.
Nutritional and Metabolic Diseases

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The causes and symptoms of nutritional and metabolic diseases
• Methods of preventing nutritional and metabolic diseases

ABOUT THEMSELVES:
• Diet can affect one’s health
• Certain disorders can be prevented with a proper diet

Materials Needed:
• Member Handout 30, Nutritional and Metabolic Diseases
• Activity Sheet 9, Nutritional and Metabolic Diseases Matching Quiz (two per member)
• Leader’s Key, Activity Sheet 9, Nutritional and Metabolic Diseases Matching Quiz
• Flip chart or chalkboard

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Many diseases of dairy cattle are not contagious because they are not caused by an infection. These diseases are usually brought on by an inadequate nutrition program which results in metabolic disorders if the nutrients are not metabolized properly. Thus, the diseases are called nutritional or metabolic diseases. The following are descriptions of the symptoms and the prevention for nutritional or metabolic diseases:

Acidosis—This disease is also known as founder. Acidosis occurs when large amounts of starch from grain are fed. Starch is fermented rapidly which causes an increase in the amount of lactic acid in the rumen. As the amount of lactic acid increases, cows may go off feed, may kick at their belly, and may exhibit some degree of diarrhea. After a time, cows may show excessive foot growth and lameness.

Acidosis may be prevented by feeding a buffering compound which neutralizes the lactic acid. The most commonly used buffer is sodium bicarbonate (bicarb) fed at the rate of 1.5 percent of the grain mix. Also, grain feeding should be increased gradually to allow the rumen microbes to adapt to increased amounts of starch.

Leader Notes

Pass out Activity Sheet 9, Nutritional and Metabolic Diseases Matching Quiz, as a pre-test to give you an idea of member’s knowledge

Discuss each disease by asking members what they know about the symptoms, preventions and possible treatments. List these on flip chart or chalkboard.

Another approach would be to have members research one or two diseases a week before the meeting. Each member could then lead a mini-discussion on each disease.
**Bloat**—Frothy-type gases accumulate in the rumen and cause distention of the abdominal cavity, especially on the left side. Breathing becomes labored and death may result from suffocation due to crowding of the heart and lungs. Bloat is usually associated with grazing legumes, especially alfalfa.

The best prevention for bloat when grazing alfalfa is to feed a bloat-preventing drug.

**Displaced Abomasum**—This condition is also known as DA. The abomasum (fourth compartment of rumen) shifts position and may twist which prevents passage of feed. This condition usually occurs in recently freshened cows fed large amounts of corn silage during the dry period or large amounts of grain and ensiled forages after freshening.

Displaced abomasum may be prevented by feeding long, dry grass hay during the dry period and including at least 5 pounds of dry forage after freshening. Avoid finely chopped forages.

**Fat Cow Syndrome**—When dry cows have been over-conditioned and have a Body Condition Score greater than 4, a condition known as fat cow syndrome may develop. These cows usually have enlarged livers due to fat deposition. Loss of appetite, retained placenta, milk fever, displaced abomasum and ketosis may occur soon after freshening.

Fat cow syndrome may be prevented by feeding a balanced ration during the dry period which does not provide for excessive fattening.

**Grass Tetany**—This condition is caused by pasturing lush grass or cereal crops which tend to be deficient in magnesium. Affected animals exhibit nervousness, loss of control of their limbs, convulsions and may die.

Grass Tetany may be controlled by feeding 2 ounces of magnesium oxide daily to grazing cattle.

**Hardware**—This disease is the result of animals eating sharp pieces of metal which accumulate in the reticulum. If a piece of this metal such as wire or a nail punctures the reticulum, the disease known as hardware develops. Although this disease is not caused by a metabolic disorder, it causes a metabolic disorder because the animal will usually quit eating. Also, a systemic infection may occur due to the puncture wound. Affected animals lose their appetite, become gaunt, are reluctant to walk and develop a fever.

Hardware may be prevented by not making hay or silage from fields where wire has been discarded. Magnets should be given to animals in herds where there is a problem. Magnets accumulate the hardware in the reticulum and prevent it from causing a puncture.
Ketosis—This metabolic disorder is also known as acetonemia which is due to low energy consumption. Therefore, it is most likely to occur during the first 6 to 8 weeks of lactation when energy requirements are the greatest and cows are losing body weight. Because early lactation energy requirements are so high, the cow’s body attempts to compensate for lack of energy in the ration by making body fat available. When more fat is being mobilized than can be metabolized, metabolic products called ketones accumulate in the blood which causes primary ketosis.

Any condition causing an animal to quit eating can cause ketosis since the animal’s energy intake is deficient. This disorder is called secondary ketosis. Animals with ketosis will be off feed and their breath will smell like acetone (finger nail polish).

To prevent ketosis, try to feed enough grain to meet the energy requirement during early lactation. The grain mix will need to be buffered to avoid acidosis. Also, try to avoid other conditions which will cause cows to go off feed, such as, over-conditioned dry cows and sudden changes in the ration.

Milk Fever—Cows with this disease do not have a fever. It is caused by low blood calcium near the time of freshening. At this time more calcium is being used to make milk than can be supplied from the blood stream. Early symptoms include quivering of muscles, then staggering, then the cow goes down and usually turns her head toward her flank. Death may occur if the cow is not treated with a solution containing calcium within a short time after going down. The condition is most likely to occur in high producing cows in the second or later lactations.

Most milk fever cases may be prevented by feeding a ration that is balanced for calcium and phosphorus during lactation and the dry period. Feeding too much calcium or phosphorus during the dry period should be avoided. Feeding alfalfa during the dry period can cause milk fever since alfalfa contains too much calcium for dry cows.

Cows with a history of milk fever may need to be fed a calcium-deficient ration two to three weeks before calving. This will cause calcium to be mobilized from the bones which can help meet the calcium requirement of early lactation.

Nitrate Poisoning—When cows consume stressed forages due to drought or frost, poisoning from nitrate may occur. Forages containing more than 5,000 part per million potassium nitrate may cause a problem. Excessive nitrate intake restricts the oxygen-carrying capacity of the blood as exhibited by its brownish color. Affected cows may exhibit labored breathing, depression and death in severe cases.
Nitrate poisoning may be prevented by testing drought- or frost-stressed forages before feeding. If forages contain high amounts of nitrates, other feeds can be included in the ration to dilute the concentration of nitrate.

**Nutritional Scours**—Overfeeding milk or milk replacer can cause scours or diarrhea. This condition exists because overfeeding causes a digestive upset. If the condition continues, other secondary infections may start and lead to death.

Nutritional scours may be avoided by limiting milk feeding to not more than 10 percent of the calf’s body weight in two equal feedings. Keeping the feeding utensils clean also helps prevent nutritional scours.

**Prussic Acid Poisoning**—Drought- or frost-stressed sorghum forages can contain excessive amounts of prussic acid which can poison cows and heifers. Symptoms are similar to nitrate poisoning, labored breathing, depression, and death, except the blood remains bright red.

The greatest risk comes from grazing these crops. Making silage or hay usually minimizes the risk of prussic acid poisoning.

**Rickets**—is a condition caused by a deficiency of vitamin D and/or calcium and phosphorus. Vitamin D is required for the proper assimilation of these minerals for bone development and growth. Calves will exhibit enlarged joints, suffer lameness and weak backs.

Exposure to sunlight is required for vitamin D to be synthesized in the body or in plants. Therefore, the condition is most prevalent in calves housed without sunlight, when no supplemental vitamin D or sun-cured forages are fed.

Milk is naturally deficient in vitamin D, but milk replacers contain adequate amounts of this vitamin. Calf starters can be supplemented with enough vitamin D (140,000 IU/lb) to prevent rickets. Older calves exposed to sunlight and fed sun-cured forages are not in danger of developing the condition, but supplemental vitamin D is recommended for adequate calcium and phosphorus assimilation.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. Have you seen any of these diseases? Which ones? How did you know the cattle had the disease?

2. What causes most of the diseases?

**Process:**
3. What is the first step in treating a nutritional or metabolic disease?

4. Why is it so important to keep dairy cows as healthy as possible?
Generalize:
5. Which of these diseases are problems in other animals?
6. What is the significance of a properly balanced diet in preventing metabolic or nutritional diseases?

Apply:
7. How will the discussions in this lesson help you in the future?

GOING FURTHER:
- Visit with a veterinarian about prevention and treatment of nutritional and metabolic diseases.

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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## NUTRITIONAL AND METABOLIC DISEASES

**DAIRY CATTLE, LEVEL IV**

Member Handout 30, Nutritional and Metabolic Diseases

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<th>DESCRIPTION</th>
<th>PREVENTION</th>
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<tr>
<td><strong>Acidosis</strong></td>
<td>Too much lactic acid is produced in the rumen when large amounts of grains are fed. Cows go off feed, may kick at their belly and may exhibit varying degrees of diarrhea.</td>
</tr>
<tr>
<td><strong>Bloat</strong></td>
<td>Frothy gases accumulate in the rumen and cause the left side of the abdomen to swell. Breathing becomes labored and death may result from suffocation due to crowding of the heart and lungs.</td>
</tr>
<tr>
<td><strong>Displaced Abomasum</strong></td>
<td>The abomasum shifts position and may twist which prevents passage of feed. Usually occurs in recently fresh cows that were fed large amounts of corn silage during the dry period. May also occur in recently fresh cows fed large amounts of grain and ensiled, finely chopped forages.</td>
</tr>
<tr>
<td><strong>Fat Cow Syndrome</strong></td>
<td>Cows over-conditioned when dry tend to have enlarged, fatty livers. Soon after calving, such symptoms as loss of appetite, retained placenta, milk fever, displaced abomasum, and ketosis may occur.</td>
</tr>
<tr>
<td><strong>Grass Tetany</strong></td>
<td>Associated with pasturing lush grass or cereal crops. Animals become nervous, lose control of their limbs, exhibit convulsions and may die. Sometimes confused with milk fever in lactating cows on magnesium-deficient rations.</td>
</tr>
<tr>
<td><strong>Hardware Disease</strong></td>
<td>Occurs when sharp pieces of metal puncture the reticulum. Animals lose appetite, become gaunt, are reluctant to walk and develop a fever.</td>
</tr>
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## NUTRITIONAL AND METABOLIC DISEASES
### DAIRY CATTLE, LEVEL IV
### Member Handout 30, Nutritional and Metabolic Diseases, continued

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
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<tr>
<td><strong>Ketosis</strong></td>
<td>Usually occurs during the first 6 to 8 weeks of lactation when body weight loss is greatest, especially in herds with restricted grain consumption. May occur anytime when appetite is depressed. Breath of affected cows smells like acetone.</td>
</tr>
<tr>
<td><strong>Milk Fever</strong></td>
<td>Usually occurs just prior to or shortly after freshening, but can occur later in lactation. Caused by low blood calcium. Early symptoms include quivering of muscles, then staggering, then the cow goes down and usually turns head toward flank. Delayed treatment can result in death.</td>
</tr>
<tr>
<td><strong>Nitrate Poisoning</strong></td>
<td>Excessive nitrate intake, usually from drought or frost-stressed forages, results in restricted oxygen-carrying capacity of the blood. Symptoms include labored breathing, brownish-colored blood, occasional abortions, depression, and death in severe cases.</td>
</tr>
<tr>
<td><strong>Nutritional Scours</strong></td>
<td>Caused by digestive upsets as the result of feeding too much milk or milk replacer. Calves develop diarrhea. More serious secondary infections may develop. Severe cases can cause death.</td>
</tr>
<tr>
<td><strong>Prussic Acid Poisoning</strong></td>
<td>Drought- or frost-stressed sorghum forages are the most common source of prussic acid. These crops are the most dangerous when grazed. Symptoms include labored breathing, depression, staggering, convulsions and death. Blood remains bright red.</td>
</tr>
<tr>
<td><strong>Rickets</strong></td>
<td>A condition of growing animals when ration is deficient in vitamin D and animals are not exposed to sunlight. Symptoms include enlarged joints, lameness, and weak back.</td>
</tr>
</tbody>
</table>
NUTRITIONAL AND METABOLIC DISEASES
DAIRY CATTLE, LEVEL IV
Activity Sheet 9, Nutritional and Metabolic Diseases Matching Quiz

Enter the number of the nutritional or metabolic disease by the best description of the disorder.

1. Acidosis ___ Caused by a deficiency of magnesium.

2. Bloat ___ Feeding too much milk.

3. Displaced Abomasum ___ Sometimes occurs when legumes are grazed.

4. Fat Cow Syndrome ___ Animal’s breath will smell like acetone.

5. Grass Tetany ___ Occurs when animals eat too much grain.

6. Hardware ___ Feeding vitamin D will prevent this disease.

7. Ketosis ___ Blood from affected animals is brownish colored.

8. Milk Fever ___ Cows go off feed when the true stomach twists.

9. Nitrate Poisoning ___ Cows are too fat at time of freshening.

10. Nutritional Scours ___ Occurs when a piece of metal punctures the reticulum.

11. Prussic Acid Poisoning ___ Affected animal’s blood will be bright red.

12. Rickets ___ Severely affected cows go down with head turned toward flank.
NUTRITIONAL AND METABOLIC DISEASES
DAIRY CATTLE, LEVEL IV
Leader’s Key, Activity Sheet 9, Nutritional and Metabolic Diseases Matching Quiz

Enter the number of the nutritional or metabolic disease by the best description of the disorder.

1. Acidosis ___ 5 Caused by a deficiency of magnesium.

2. Bloat ___ 10 Feeding too much milk.

3. Displaced Abomasum ___ 2 Sometimes occurs when legumes are grazed.

4. Fat Cow Syndrome ___ 7 Animal’s breath will smell like acetone.

5. Grass Tetany ___ 1 Occurs when animals eat too much grain.

6. Hardware ___ 12 Feeding vitamin D will prevent this disease.

7. Ketosis ___ 9 Blood from affected animals is brownish colored.

8. Milk Fever ___ 3 Cows go off feed when the true stomach twists.

9. Nitrate Poisoning ___ 4 Cows are too fat at time of freshening.

10. Nutritional Scours ___ 6 Occurs when a piece of metal punctures the reticulum.

11. Prussic Acid Poisoning ___ 11 Affected animal's blood will be bright red.

12. Rickets ___ 8 Severely affected cows go down with head turned toward flank.
Individual Cow’s Production Records

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of being able to evaluate individual cow’s production record
• The factors that affect a cow’s production record
• How to compare cow’s productivity within the herd and among cows in another herd

ABOUT THEMSELVES:
• Meaningful information is needed before any meaningful evaluations can be made

Materials Needed:
• Member Handout 31, DHIA-200A Sample Day and Lactation Report

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

It is important to evaluate an individual cow’s productivity so breeding, feeding and management decisions can be made. When milk goes from the cow directly into a pipeline, the productivity of each cow cannot be accurately measured. The DHIA program provides a routine, accurate method of measuring an individual cow’s productivity.

Even though it is relatively simple to measure each cow’s production, it is not easy to compare individual cow production to other cows because there are many factors that affect the completed records. Such things as age, length of lactation, month of calving, times milked per day, and the herd in which the record was made complicate the evaluation of a production record.

The United States Department of Agriculture (USDA) developed adjustment factors to standardize production records. These factors are applied to individual production records and the results are known as 305-2X-M.E. records. This standardization procedure means the record has been adjusted as though the cow’s lactation was 305 days in length, she was milked two times per day, and she was a mature cow. The adjustment for age is called Mature Equivalent (M.E.). The M.E. factor also contains a factor that adjusts the M.E. for the season of calving.
Pass out Member Handout 31, Sample DHIA-200A Sample Day and Lactation Report. Discuss the figures shown in the 305-2X-M.E. column and compare those records to the figures shown in the Difference from Herdmates column. Have members find cows that are herdmates.

Ask members to look at Member Handout 31, DHIA-200A Sample Day and Lactation Report, and indicate which cows were over and under fed.

The M.E. adjustment is made because young cows produce less milk than mature cows which are between five and six years of age. A season of calving adjustment is made, because cows freshening during hot weather normally do not produce as well as those freshening during cool weather.

The 305-2X-M.E. record makes it easy to compare all cows of the same breed within the same herd. In fact the DHIA 200 Sample Day and Lactation Report makes this comparison in the Difference from Herdmates column. The values shown here are plus or minus values which indicate how much above (+) or below (-) herdmates each cow’s 305-2X-M.E. record is. It should be noted that the herdmates of each cow are the cows in the same herd of the same breed that freshened during the same season.

The Difference from Herdmates value is the best way to evaluate each cow’s production record. The 305-2X-M.E. records are calculated for each cow after they have been in milk for at least 45 days. Each month, when the cows are tested again, a new 305-2X-M.E. is calculated, and in most situations, will change somewhat until the cow has been in milk nearly 305 days. These are projected 305-2X-M.E. records and are based upon the amount of milk already produced in the lactation.

The difference from herdmates value is the best way to evaluate the productivity of cows regardless of where the record was made. A cow with a 21,000-pound 305-2X-M.E. record whose Difference from Herdmates is -1,000 pounds is more than likely a less productive cow than one whose 305-2X-M.E. is 19,000 pounds with a Difference from Herdmates of +1,000 pounds.

In the above example the cow with the 21,000 pound record was more than likely in a herd with better feeding and management practices since her herdmates averaged 22,000 pounds. The lower producing cow is probably more productive since her 305-2X-M.E. was 1,000 pounds above her herdmates which averaged 18,000 pounds. Hence, the Difference from Herdmates value helps remove the effects of feeding and management (environment) when comparing cows in different herds.

The cow with the 21,000 305-2X-M.E. would be expected to have a 305-2X-M.E. in the lower producing herd of about 17,000 (18,000–1,000). The cow with the 19,000 305-2X-M.E. would be expected to produce 1,000 pounds above herdmates in the higher producing herd which would result in a 305-2X-M.E. of about 23,000 pounds.

Grain mix-fed needed—This part of the report indicates pounds of grain fed on a sample day compared to what the cow actually needed. Example: Aggie (first cow listed) should have been fed 3 more pounds to meet her energy needs.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What was the most difficult thing to understand about this lesson?

Process:
2. What kinds of data will the 305-2X-M.E. give you that you wouldn’t be able to evaluate otherwise?
3. What decision will you be able to make with the 305-2X-M.E.?

Generalize:
4. In school you are compared to your classmates. Is this always fair? Why or why not?
5. What are the things that you are able to do now that you couldn’t do two years ago? Five years ago? Why?

Apply:
6. What are the factors that affect your (1) athletic abilities, (2) mental abilities and (3) social skills? How can you adjust these factors to maintain a balanced life?

GOING FURTHER:
1. Compare the actual production to the 305-2X-M.E. of some young cows. Make that same comparison with some older cows.

REFERENCES:

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

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131–Dairy Cattle, Level IV
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**Individual Cow's Production Records**

**Dairy Cattle, Level IV**

Member Handout 31, DHIA 200-A Sample Day and Lactation Report

**Sample Day and Lactation Report**

**Member Day 31, DHIA 200-A**

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</tr>
<tr>
<td>Feed</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Milk Fed</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Fat Fed</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Lactation Fed</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
</tbody>
</table>

DHIA-200A: Member Handout 31, DHIA 200-A: Sample Day and Lactation Report

---

**Individual Cow's Production Records**  
**Dairy Cattle, Level IV**

Member Handout 31, DHIA 200-A Sample Day and Lactation Report
Herd Summary—Production Records

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The interpretation of data on the DHIA Herd Summary
• How the DHIA Herd Summary can be used to evaluate production efficiency

ABOUT THEMSELVES:
• The evaluation of averages can tell a lot about performance

Materials Needed:
• Member Handout 32, DHIA-202A and 202B Herd Summary

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

The Dairy Herd Improvement Association (DHIA) Herd Summary tells dairy producers a lot about the performance of their herds. The summary can be used to evaluate the production efficiency of a herd, and it can indicate what needs to be improved in order to improve production efficiency. This lesson will discuss some of the information shown on the DHIA-202A and 202B Herd Summary.

Production Summary: This section is considered the best evaluation of production efficiency for a herd of cows. It shows the Rolling Herd Average (RHA) for each of the tests during the last 365 days. A comparison of RHA’s throughout the year will indicate if the herd is improving production efficiency.

The RHA is the average per cow actual production during the last 365 days. It is a rolling average since the average is updated each time the herd is tested. Therefore, the RHA shows the average production during the last 365 days. We will now discuss other factors affecting RHA.

Reproductive Summary: The reproductive performance of the herd is shown in this section. The summary includes cows and heifers that are pregnant, possibly pregnant, and open. The heifers are shown on the top line of each section. The animals included in the pregnant section are those cows and heifers which have been reported bred for at least 90 days or have been diagnosed pregnant. The possibly pregnant cows and heifers

Leader Notes
Pass out Member Handout 32, DHIA-202A and 202B Herd Summary. Discuss each of the sections.
are the ones who have been reported bred but have been bred <90 days and have not been diagnosed pregnant. The open animals have not been reported bred.

The days minimum freshening interval shown at the extreme right of this section is calculated by adding the gestation period to the average days open. If the freshening interval is >375 days, the cows will not be lactating long enough.

The average age for heifers and days for cows to first bred in most herds will indicate why the freshening interval is too long. In order to have a nearly ideal freshening interval, the days to first bred should be about 60. In addition, the average services per conception needs to be about 1.7 for cows. A long freshening interval means the cow was dry too long.

**Days Dry Summary**: This section summarizes the average length of dry periods. The number of cows dry <40 days, 40 to 70 days, and >70 days is shown. If cows are turned dry according to the date shown to turn cows dry, there should be a very low percentage of cows dry <40 or >70 days. When average days dry are greater than (> 60) the percent days in milk is reduced, which lowers milk production and profits.

**Herd Sire Evaluation**: This summary shows the average Predicted Transmitting Abilities (PTA) of the sire of the animals in the herd grouped by age. One column shows the number of animals in each age group that are sired by unproven sires (without PTA) or their sire has not been identified. The next column shows the number of animals sired by proven sires (with PTA). The PTA averages should be the highest for the youngest animals and lowest for the oldest in herd that are selecting good AI sires because there is a better group of AI sires to select from with each generation.

The bottom of the section shows the PTA’s of service sires being used today. The top average is the average of the service sires with PTA’s (proven) and the bottom average includes the service sires without PTA’s (unproven). This average includes a PTA value of zero for the unproven sires.

**Lactation Summary**: This section shows the 305-2X-M.E. lactation average by lactation number. The lactation average is different than the RHA because most of the factors that affect the RHA do not affect the lactation average. Since this average is a 305-2X-M.E. average, young cows are given credit for milk that has not actually been produced. Therefore, the lactation average will usually be about 10 percent higher than the RHA. If the first lactation average is much lower than the other averages, there is an indication that the first lactation heifers may not be grown well enough before freshening.
Stage of Lactation Profile: This section summarizes the test day production of all cows milking on test day. The summary is subdivided by lactation number of the cows and by days in milk, and then all cows are summarized by days in milk. High producing herds will show the highest production average in the first two stages (<50 days or 50—100 days in milk). Then the average production by stage of lactation will decline gradually in later stages of lactation. A sudden drop in the average after 50 or 100 days in milk may indicate that the herd is not being fed enough energy and the cows are too thin.

Miscellaneous Herd Information: This section contains one of the most useful summaries for evaluating potential production problems. This is the Average Summit Lbs. Milk (Summit Milk Yield). Summit Milk Yield represents the average milk weight of the two highest weights out of the first three tests. It is the best estimate of the peak of the lactation curve for each animal. High producing herds will average >60 pounds for first lactations, >80 pounds for second lactations, while the oldest cows will usually have Summit Milk Yields 5 to 10 pounds higher than second lactation cows.

The Summit Milk Yield summary can indicate how well a herd is being fed and managed. If the first lactation Summit Milk Yield averages <60 pounds, the heifers may not be large enough at freshening. If the difference between Summit Milk Yields of first and second lactation cows is less that 20 pounds, the cows probably had low body condition scores.

Every dairy farmer’s goal ought to be to have high Summit Milk Yields because the total lactation yield is closely related to how well cows milk in early lactation.

The Miscellaneous Herd Information also shows Somatic Cell Count averages. These averages are taken from the Somatic Cell Count Report and the use of this information is covered in another lesson (using the Somatic Cell Count Report).

Feeds Reported on Sample Day: This section is a summary of the feeds that were fed. The summary includes the amount of feeds, their prices, and nutrient contents.

Cost and Return Summary: This section summarizes the feed costs and milk income on test day and annually. The difference between milk income and feed cost is income over feed cost.

Birth and Inventory Summary: Summary of all calves born. Calving difficulty indicates (1=no assistance, 5=major difficulty).

Feed Summary: Total feed fed per cow per year. The desired pounds of forage, dry matter basis, per hundred pounds of body weight is 1.8 to 1.9. The desired pounds of milk produced per pound of grain fed is 2.5.
Leader Notes

ACTIVITY

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What was the hardest part of the Herd Summary to understand? The easiest? Why?

Process:
2. Why is the Herd Summary such an important piece to dairy producers?
3. Which section do you think you would use the most in your herd? The least? Why?

Generalize:
4. How can you tell if the average leads you to a correct conclusion about the whole herd?
5. Do you often make judgements based only on one event or individual? Relate an experience when your judgement was based not on the average, but on one event. What were the consequences?

Apply:
6. Do you think that your grades in school are correctly assessing your knowledge when they are based on averages over a whole year? Why or why not? What might happen if they were based only on one test at the end of the year?

GOING FURTHER:
• Run the Dairy Herd Analyzer using the information of the Sample DHIA-200 Herd Summary. The Dairy Herd Analyzer is discussed in another lesson in this section.
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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## HERD SUMMARY—PRODUCTION RECORDS

### DAIRY CATTLE, LEVEL IV

**Member Handout 32, DHIA-202A and 202B Herd Summary**

---

### SUMMARY OF ANIMALS TO BE MILKING, DRY, OR FRESH

<table>
<thead>
<tr>
<th>Group</th>
<th>Replace Females</th>
<th>Number</th>
<th>Days Open</th>
<th>Days Nonchoke</th>
<th>Days Choke</th>
<th>Age / Days</th>
<th>Breeding Interval</th>
<th>Days Minimum Freshening Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant</td>
<td>9</td>
<td>19</td>
<td>7</td>
<td>2</td>
<td>1–92</td>
<td>3</td>
<td>1</td>
<td>408</td>
</tr>
<tr>
<td>Possibly Pregnant</td>
<td>11</td>
<td>167</td>
<td>5</td>
<td>1</td>
<td>193</td>
<td>3</td>
<td>4</td>
<td>423</td>
</tr>
<tr>
<td>Open</td>
<td>19</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>147</td>
<td>3</td>
<td>1</td>
<td>325</td>
</tr>
</tbody>
</table>

### REPRODUCTIVE SUMMARY

#### DHIA-202A

**HERD SUMMARY**

**3 KILDEE HALL ISU**

**AMES**

**IA 50011**

**EBS**

**REPRODUCTIVE SUMMARY**

**Herdscore** 42-85-0313  **Breed** RH 68  **Shed** GP 429901  **Accr** 00 DHIA 5-31-98

**Test Interval** 35.3  **Length** 32  **From** 4-30  **To** 0-02  **Received at Lab** 0-10  **Barn Sheet Recd** 10-01  **Mailed** 0-11

**REPRODUCTIVE SUMMARY**

<table>
<thead>
<tr>
<th>Group</th>
<th>Replace Females</th>
<th>Number</th>
<th>Days Open</th>
<th>Days Nonchoke</th>
<th>Days Choke</th>
<th>Age / Days</th>
<th>Breeding Interval</th>
<th>Days Minimum Freshening Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant</td>
<td>9</td>
<td>19</td>
<td>7</td>
<td>2</td>
<td>1–92</td>
<td>3</td>
<td>1</td>
<td>408</td>
</tr>
<tr>
<td>Possibly Pregnant</td>
<td>11</td>
<td>167</td>
<td>5</td>
<td>1</td>
<td>193</td>
<td>3</td>
<td>4</td>
<td>423</td>
</tr>
<tr>
<td>Open</td>
<td>19</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>147</td>
<td>3</td>
<td>1</td>
<td>325</td>
</tr>
</tbody>
</table>

### IDENTIFICATION SUMMARY

**HERD SIRE EVALUATION**

**DAYS DRY SUMMARY**

**LACTATION SUMMARY**

305 X 240 DIFF FROM HERDMEANS

### PRODUCTION SUMMARY

<table>
<thead>
<tr>
<th>Sample Day</th>
<th>Days Heat Period</th>
<th>% in Milk</th>
<th>% Fat</th>
<th>% Protein</th>
<th>Test Interval Daily Average</th>
<th>Rolling 365 Days Average</th>
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<tbody>
<tr>
<td>6-05</td>
<td>4</td>
<td>99</td>
<td>90</td>
<td>67.9</td>
<td>59.9</td>
<td>Milk 3.26</td>
</tr>
<tr>
<td>7-06</td>
<td>11</td>
<td>100</td>
<td>94</td>
<td>68.5</td>
<td>53.2</td>
<td>Milk 3.19</td>
</tr>
<tr>
<td>8-17</td>
<td>11</td>
<td>100</td>
<td>94</td>
<td>70.6</td>
<td>56.7</td>
<td>Milk 3.38</td>
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<tr>
<td>9-11</td>
<td>10</td>
<td>100</td>
<td>94</td>
<td>67.7</td>
<td>59.2</td>
<td>Milk 3.41</td>
</tr>
<tr>
<td>10-19</td>
<td>11</td>
<td>100</td>
<td>94</td>
<td>75.9</td>
<td>56.7</td>
<td>Milk 3.35</td>
</tr>
<tr>
<td>11-25</td>
<td>10</td>
<td>100</td>
<td>94</td>
<td>73.6</td>
<td>59.6</td>
<td>Milk 3.32</td>
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<tr>
<td>12-21</td>
<td>10</td>
<td>100</td>
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<td>65.6</td>
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<td>13-25</td>
<td>10</td>
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<td>75.3</td>
<td>67.6</td>
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<td>14-25</td>
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<td>100</td>
<td>94</td>
<td>73.6</td>
<td>59.6</td>
<td>Milk 3.33</td>
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**Samples 17 Tests**

**Cow Years 53.36**

---

**HERD SUMMARY—PRODUCTION RECORDS**

**DAIRY CATTLE, LEVEL IV**

**Member Handout 32, DHIA-202A and 202B Herd Summary**
## Herd Summary

**Herd Code**: 42-85-0313  
**Breed**: RH  
**Birth Date**: 5-31-98

### Stage of Lactation Profile

<table>
<thead>
<tr>
<th>Days in Milk</th>
<th>&lt; 50</th>
<th>50 - 100</th>
<th>101 - 200</th>
<th>201 - 300</th>
<th>&gt; 300</th>
<th>Total</th>
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<tbody>
<tr>
<td>First</td>
<td>1</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Lactation</td>
<td>17</td>
<td>151</td>
<td>26</td>
<td>365</td>
<td>104</td>
<td>5</td>
</tr>
<tr>
<td>Animals</td>
<td>18</td>
<td>79.0</td>
<td>66.6</td>
<td>46.5</td>
<td>69.1</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>16</td>
<td>19.1</td>
<td>31.1</td>
<td>184</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lactation</td>
<td>36</td>
<td>56.3</td>
<td>60.0</td>
<td>68.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>115.5</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactation</td>
<td>155</td>
<td>259</td>
<td>399</td>
<td>260</td>
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<td></td>
</tr>
<tr>
<td>Animals</td>
<td>102.9</td>
<td>85.2</td>
<td>47.8</td>
<td>80.1</td>
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<tr>
<td>All</td>
<td>73.8</td>
<td>160</td>
<td>267</td>
<td>378</td>
<td>213</td>
<td></td>
</tr>
<tr>
<td>Milking</td>
<td>75</td>
<td>755</td>
<td>211</td>
<td>1350</td>
<td>679</td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>3.4</td>
<td>4.0</td>
<td>3.0</td>
<td>4.8</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Percent Above</td>
<td>50</td>
<td>38</td>
<td>14</td>
<td>33</td>
<td>32</td>
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</table>

### Feeds Reported on Sample Day

<table>
<thead>
<tr>
<th>Feed Name</th>
<th>$/ton or $/Milestone</th>
<th>Pounds Fed</th>
<th>% D M</th>
<th>% Protein</th>
<th>MCAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCENTRATES</td>
<td>133</td>
<td>18</td>
<td>83</td>
<td>K</td>
<td>90</td>
</tr>
<tr>
<td>CORN SILAGE</td>
<td>80</td>
<td>10</td>
<td>65</td>
<td>T</td>
<td>37</td>
</tr>
<tr>
<td>ALFALFA HAY</td>
<td>99</td>
<td>7</td>
<td>67</td>
<td>V</td>
<td>90</td>
</tr>
<tr>
<td>DRY HAY</td>
<td>80</td>
<td>50</td>
<td>67</td>
<td>V</td>
<td>90</td>
</tr>
<tr>
<td>ALFALFA HAY</td>
<td>40</td>
<td>7</td>
<td>91</td>
<td>R</td>
<td>90</td>
</tr>
<tr>
<td>TOPDRESS 2</td>
<td>237</td>
<td>68</td>
<td>91</td>
<td>K</td>
<td>90</td>
</tr>
<tr>
<td>39 COTTON SE</td>
<td>157</td>
<td>TP</td>
<td>75</td>
<td>K</td>
<td>44</td>
</tr>
<tr>
<td>SOY BEAN MEL</td>
<td>190</td>
<td>2</td>
<td>75</td>
<td>K</td>
<td>90</td>
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Last Changed: 6-03-92

### Cost and Return Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Dollars Per Cow on Sample Day</th>
<th>Dollars Per Herd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage Cost</td>
<td>.89 1.57</td>
<td>31 10,500</td>
</tr>
<tr>
<td>Grain Cost</td>
<td>2.27</td>
<td>12 27,122</td>
</tr>
<tr>
<td>Total Feed Cost</td>
<td>3.16 1.57</td>
<td>36 37,712</td>
</tr>
<tr>
<td>Milk Value</td>
<td>8.44</td>
<td>270 94,991</td>
</tr>
<tr>
<td>Income / Feed Cost</td>
<td>5.28 1.57</td>
<td>166 57,279</td>
</tr>
<tr>
<td>Feed Cost / CWF Milk</td>
<td>4.46</td>
<td>4.59 4.71</td>
</tr>
<tr>
<td>Return / Feed Cost</td>
<td>2.67</td>
<td>2.59 2.52</td>
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</tbody>
</table>

### Feed Summary

<table>
<thead>
<tr>
<th>Feed Type</th>
<th>Annual LBS/Day/LBS/Cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRY HAY</td>
<td>3.794</td>
</tr>
<tr>
<td>CORN SILAGE</td>
<td>10.778</td>
</tr>
<tr>
<td>HAYLAGE</td>
<td>3.794</td>
</tr>
<tr>
<td>CONCENTRATE</td>
<td>9.377</td>
</tr>
</tbody>
</table>

### Miscellaneous Herd Information

<table>
<thead>
<tr>
<th>LACT.</th>
<th>Notes</th>
<th>Avg. SCC</th>
<th>SCC Above 400,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>83.8</td>
<td>446</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>82.5</td>
<td>89</td>
</tr>
<tr>
<td>3+</td>
<td></td>
<td>116.4</td>
<td>1125</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>97.1</td>
<td>679</td>
</tr>
</tbody>
</table>

## Birth and Inventory Summary

### Offspring Born

<table>
<thead>
<tr>
<th>Dam's Lact</th>
<th>Males</th>
<th>Females</th>
<th>Carving Difficulty Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>17</td>
<td>3</td>
</tr>
</tbody>
</table>

Inventory Changes since last report:

- Replacements: 1
- Lactation 1: 0
- Lactation 2+: 0
- Total: 1
Understanding the DHIA Somatic Cell Count Report

Dairy Cattle, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:
• The importance of using somatic cell counts for evaluating udder health in a dairy herd
• How to use the DHIA Somatic Cell Count Report to diagnose udder health problems

ABOUT THEMSELVES:
• The interpretation of some results requires careful study
• The value of records and quality in their life.

Materials Needed:
• Member Handout 33, DHIA-230 Somatic Cell Count Report
• Member Handout 34, Interpreting Somatic Cell Count Report

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Mastitis is the most costly disease in the dairy industry. It is defined as an inflammation of the mammary system. There are two types of mastitis—clinical and subclinical. Clinical mastitis is easily detected by an abnormal appearance of the milk or a swelling in the udder. Subclinical mastitis can only be detected by culturing the milk for mastitis causing bacteria or by a somatic cell count (SCC).

Somatic cells in milk are primarily leukocytes or white blood cells along with sloughed epithelial or milk secreting cells. The level of SCC is related to the degree of stress on the udder. The most common stress involved with elevated SCC is an invasion of bacteria in the mammary system which causes mastitis. So, the SCC is a good indicator of an infection in the mammary system or mastitis.

The SCC is also a good indicator of milk quality. As the SCC increases, milk quality decreases. High SCC milk yields less cheese and the flavor score of milk is reduced. For these reasons, most milk markets pay a premium for low SCC milk.

Milk with an SCC greater than 750,000 can not be marketed. A SCC is run on every shipment of milk to determine if it is legal to sell and to determine if the milk qualifies for a quality premium.

Leader Notes

Using Member Handout 34, Interpreting Somatic Cell Count Report, ask members a few questions to evaluate their basic knowledge.
Research has demonstrated that milk production goes down as the SCC goes up. This loss is hard to visualize since the milk from most cows with a high SCC appears normal, but it is well established that milk production is decreased 1 1/2 pounds per day as the SCC goes from 100,000 to 200,000. Each time the SCC is doubled (200,000 to 400,000 or 400,000 to 800,000) an additional 1 1/2 pound loss occurs.

The goal of every dairy farmer should be to produce milk with a low SCC since it is related to udder health, quality premiums and lost milk production. Understanding and using the DHIA SCC Report can help accomplish this goal.

The DHIA milk sample is tested for SCC each time participating herds are tested through the DHIA program. The counts for each cow are shown on the report for the last six tests. This is a convenient way to identify problem cows. Cows with SCC’s higher than 400 (the last three zeros are not printed on the report, thus 400 = 400,000) for a few consecutive tests probably have subclinical mastitis. A dry cow treatment may cure these cows while they are dry. However, these cows should be considered as potential culls.

The summary of the SCC Report contains the following information:

**Lactation Averages:** This table shows average SCC of cows according to lactation number along with the number and percentage of cows with SCC’s above 400,000.

This table is very useful for diagnosing problem situations. First lactation cows should average less than 100,000 if most of the heifers are not infected prior to or at the time of freshening. If this average is too high, heifers may be infected with mastitis-causing organisms from a pond in the pasture or in the springer lot.

Sometimes averages can be misleading. One extremely high SCC heifer could make the average of the first lactation animals high. This would not be considered a consistent problem with first lactation animals. The goal for first lactation cows is to have less than 5 percent of the animals in this group with SCC’s above 400,000.

**Weighted Herd Average SCC By Sample Day:** This table shows the SCC average for the herd for the last six test days. The averages are weighted for the amount of milk from each cow and the SCC. This information is useful for monitoring the herd SCC average. It can also indicate the effects of changing something about the milking management program that may or may not affect SCC. The column on the extreme right shows the SCC average of the Top 25 percent (lowest SCC average) in the Mid-States.
ACTIVITY

SCC Summary: This table shows the distribution of SCC’s in the herd according to SCC ranges. The distribution pattern of the Mid-State Top 25 percent should be a goal.

Days in Milk Averages: Cows’ SCC’s have been sorted according to days in milk on this test day. Hence, this table provides a stage of lactation SCC summary. As cows go through different stages of lactation, their SCC should follow the trend of the Mid-States Top 25 percent.

This table can indicate problems that may exist in the herd. Note that the lowest group average in the Mid-States Top 25 percent is the group in milk 50 to 100 days. Herds with higher than desirable SCC averages sometimes find that the cows in milk under 50 days have the lowest average. Then the averages get higher with each stage of lactation. This indicates that the cows are becoming infected during lactation. It may be due to poor milking procedures, inadequate milking equipment, or poor sanitation inside or outside the parlor.

The Days in Milk Averages also can be a good indicator of the effectiveness of the dry cow treatment and management program. A cow’s SCC can be lowered while she is dry if the dry treatment is effective and she does not become reinfected before freshening. By comparing the SCC average of the cows in milk over 300 days to those in milk under 50 days, an evaluation of the dry cow program can be made.

New Infections: An animal is considered having a new infection if her SCC is above 400,000 this test but was below 400,000 last test.

Animals Over 400 Somatic Cell Count: Cows with an SCC greater than 400 (400,000) are listed in this summary. Those with an asterisk by their count are noted as newly infected animals.

The linear score is the logarithm of the SCC. Linear score is reported since it correlates closely with milk loss. Note the milk losses associated with SCC in the Relationship of Linear Score to Milk Loss table. Milk loss per day per cow and per herd along with the dollar losses are shown in a table.

The percent contribution column shows the contribution to the herd average SCC. These values have been weighted for the amount of milk each cow is producing. The milk from cows with a high percent contribution should be saved for feeding to calves. This will lower the bulk tank SCC, and the milk may qualify for quality premiums.

The list of cows over 400,000 SCC is not intended to be used to select cows for mastitis treatment. In most cases, treatment of lactating cows will not lower their SCC.

Leader Notes

How well does the sample herd compare to Mid-State Top 25 percent?

What cows in the sample herd should have their milk saved for calf feeding?
Ans. 1435, 1249

Give each member a copy of Member Handout 34, Interpreting Somatic Cell Count Report, as a review and for their record book.
ACTIVITY

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What part of the SCC was easiest to understand? Hardest? Why?

2. What is mastitis? What are the two types?

Process:
3. How does the somatic cell content affect milk quality?

4. How can some of the averages be misleading?

5. What kind of decisions can be made using the information given in DHIA-230?

Generalize:
6. Where do you get your information to make decisions that affect your life?

7. What records or reports do you use in your daily life? Why?

Apply:
8. How important is quality in the activities that you do? Why?

9. What are the rewards for completing quality work?

GOING FURTHER:
• Visit with a milk marketing organization and ask about their SCC quality premiums. If the organization is paying a premium for low SCC milk, ask them why.
UNDERSTANDING THE DHIA SOMATIC CELL COUNT REPORT

DAIRY CATTLE, LEVEL IV

Member Handout 33, DHIA-230 Somatic Cell Count Report
### UNDERSTANDING THE DHIA SOMATIC CELL COUNT REPORT

**DAIRY CATTLE, LEVEL IV**

Member Handout 33, DHIA-230 Somatic Cell Count Report, continued

#### MID-STATES DRPC SOMATIC CELL DETAIL

<table>
<thead>
<tr>
<th>Herdcode</th>
<th>Sample Date</th>
<th>Lab Date</th>
<th>Mail Date</th>
<th>MID-STATES DRPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-85-1273</td>
<td>11-26-9</td>
<td>11-28-9</td>
<td>11-30-9</td>
<td>1</td>
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</table>

#### COMPUTER NUMBER

<table>
<thead>
<tr>
<th>PREVIOUS 5 SAMPLE DAY SBC SCORES (000s)</th>
<th>CURRENT LACTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-26</td>
<td>7-25</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**NOTE:** XXX = SAMPLE MISSING OR INSUFFICIENT

*C COUNT OVER 400,000

**I N ADP-DV-DSIDOS**

---

**I47—Dairy Cattle, Level IV**
Individual Cow SCC: The last six SCC’s are shown for each cow. The counts are shown in thousands of cells (.000 left off). Cows with SCC’s above 400 are shown with an asterisk indicating a high degree of probability of subclinical mastitis.

Cows with several counts above 400 should be considered problem cows. Culling may be the best option. However, when turned dry, some of these cows can be cured with a dry cow treatment. Treating these cows during lactation is not recommended.

Lactation Averages: The herd is sorted by lactation number for observing the effects of age on SCC average. Almost all herds rank according to age; as the cows get older the SCC average increases.

The most important group to consider is the first lactation cows. Their average should be below 100 which indicates a low incidence of mastitis infection. If the first lactation cows’ SCC is too high, they are probably being infected in a pond or in an unsanitary springer pen.

The incidence of first lactation cows with SCC’s above 400 should be 5 percent or less.

Weighted Herd Average SCC by Sample Day: This summary can be used to monitor and evaluate udder health. If the average is increasing, look for the cause. If milking management is changed, a change in the SCC averages should occur in the next couple of months.

SCC Summary: The distribution of SCC’s according to SCC ranges is shown in this table. The distribution pattern of the Mid-States Top 25% should be the goal.

Days in Milk Averages: SCC’s are sorted according to stage of lactation. As cows go through different stages of lactation, their SCC should follow the trend of the Mid-States Top 25%.

In low somatic cell count herds, the lowest group average will be the cows in milk 50–100 days. As lactations progress, the counts will be slightly higher. If the cows in milk under 50 days are the lowest group and the other groups are considerably higher, it would appear that the process of milking is creating a stress. The milking equipment may be causing an irritation or sanitation inside or outside the parlor may be a problem.

New Infections: An animal is considered having a new infection if her SCC is above 400 this test but was below 400 last test.

Animals Over 400 Somatic Cell Count: These cows probably have subclinical mastitis. Those with an asterisk are new on the list this test. Treatment of these cows is not recommended while lactating.

The percent contribution indicates how much each cow is contributing to the herd average.

Milk from cows with a high contribution should be saved for calf milk. This will lower the bulk tank SCC, and improve the prospects for quality premiums.

Milk Loss: Shows the milk loss per cow, per day, and per herd. The dollar losses have been calculated from milk price.
Analyzing DHIA Records—
The Dairy Herd Analyzer
*Dairy Cattle, Level IV*

What Members Will Learn . . .

**ABOUT THE PROJECT:**
- To evaluate economic losses in a dairy herd due to (1) reproduction, (2) nutrition, (3) milk quality and (4) genetics
- Possible ways to reduce economic losses in dairy herds

**ABOUT THEMSELVES:**
- Methods to form and evaluate opinions
- How to draw conclusions from information
- How to evaluate their accomplishments

**Materials Needed:**
- A PC-compatible computer and printer
- The Dairy Herd Analyzer computer program from K-State Research and Extension—Dairy
- Member Handout 35, Dairy Herd Analyzer Input (Sample)
- Member Handout 36, Dairy Herd Analyzer Expected Improvement (Sample)
- Members’ DHIA Herd Summary (DHIA 202)
- Activity Sheet 10, Dairy Herd Analyzer Input
- Member Handout 37, Sample Herd Summary
- Member Handout 38, Dairy Herd Analyzer Standard Recommendations

**ACTIVITY TIME NEEDED:** 60 MINUTES

**ACTIVITY**

The Dairy Herd Improvement (DHI) program provides valuable information to dairy farmers for making feeding, breeding, and management decisions. Yet, the only economic information provided by the program is feed cost/cwt. milk produced and income over feed cost. The Dairy Herd Analyzer (DHA) computer program was developed to evaluate economic losses in dairy herds due to (1) reproduction, (2) nutrition, (3) milk quality and (4) genetics. All of the input information for the computer program may be found on the Herd Summary (DHIA-202).

The program may be run from the diskette by typing at the A prompt Run DHA <enter>. The cell pointer will be located at today’s date. Press <enter> and the cell pointer will move to the space for entering the name. After typing the name, press <enter> and the cell pointer will move to the next cell. Continue entering the input data.

**Leader Notes**

The DHA computer program should be ordered from KSU Dairy Extension prior to the meeting. When ordering the program, please send a formatted diskette and request the Baled version of the DHA. The DHA diskette needs to be updated about once each year to keep up with the economic factors. Simply return the diskette for updating.

Pass out Member Handout 35 and 36, Dairy Herd Analyzer Input and Expected Improvement (Samples). Review and use as guides.
ACTIVITY

The only inputs not shown on the Herd Summary are the Maximum Milk Quality Premium and the Milk Quality Premium Received. If these values are not known, a zero may be entered for each of these values.

When the last entry has been made, the results may be viewed by holding down the ALT key while pressing the S key. To print the results, hold down ALT and press P.

Using the members’ Herd Summaries, enter the inputs into the DHA and print the results for each member. Before running the next DHA, press ALT O to prepare the worksheet. The new inputs may be made by typing over the existing entries.

The printout shows the inputs on page 1 and, page 2 is the calculated potential losses of income over feed cost.

To exit the program, press /QY.

Recommendations for improvements in the areas of reproduction, nutrition, milk quality and genetics are provided.

DIALOGUE FOR CRITICAL THINKING:

Share:
1. What happened when you ran the DHA program?
2. What was most difficult for you to do?

Process:
3. What problems occurred for you? Why?
4. What was the most important information you got from the program concerning your cows?
5. What conclusions can you draw about how reproduction, nutrition, milk quality and genetics affects your cattle?

Generalize:
6. Why do people sometimes draw conclusions and form opinions without complete and correct information?
7. How can you form more careful evaluations?

Apply:
8. What did you learn from this lesson that will help you make decisions in the future?
GOING FURTHER:
• Run the DHA again to compare the nutritional losses when the Rolling Herd Average increased 2,000 pounds.
• Run the DHA again to compare the reproductive losses when the freshening interval is reduced by 10 days.

REFERENCES:

Author:
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:
Edward P. Call, Professor Emeritus, Dairy Science, Kansas State University
## Analyzing DHIA Records—The Dairy Herd Analyzer

### Dairy Cattle, Level IV

Member Handout 35, Dairy Herd Analyzer Input (Sample)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. DATE</strong></td>
<td><strong>05-00-00</strong></td>
</tr>
<tr>
<td><strong>2. HERD CODE</strong></td>
<td>48-00-0000</td>
</tr>
<tr>
<td><strong>3. ROLLING 365 DAY MILK AVERAGE</strong></td>
<td>18,899</td>
</tr>
<tr>
<td><strong>4. ROLLING 365 DAY FAT AVERAGE</strong></td>
<td>673</td>
</tr>
<tr>
<td><strong>5. NUMBER OF PRODUCING FEMALES ON FARM</strong></td>
<td>71</td>
</tr>
<tr>
<td><strong>6. DAYS MINIMUM FRESHENING INTERVAL</strong></td>
<td>388</td>
</tr>
<tr>
<td><strong>7. AVERAGE DAYS DRY</strong></td>
<td>69</td>
</tr>
<tr>
<td><strong>8. AVERAGE SERVICES PER CONCEPTION PRODUCING FEMALES</strong></td>
<td>2.3</td>
</tr>
<tr>
<td><strong>9. NUMBER OF PREGNANT COWS BRED ONCE</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>10. NUMBER OF PREGNANT COWS BRED TWICE</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>11. NUMBER PREGNANT COWS</strong></td>
<td>32</td>
</tr>
<tr>
<td><strong>12. NUMBER COWS WITH BREEDING INTERVALS 18 TO 24 DAYS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>13. NUMBER OF PG COWS WITH BREEDING INTERVALS &gt;18 DAYS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>14. NUMBER OF PG COWS WITH BREEDING INTERVALS &gt;24 DAYS</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>15. NUMBER OF FEMALES—LACTATION 1</strong></td>
<td>27</td>
</tr>
<tr>
<td><strong>16. AVERAGE AGE (MONTHS) LACTATION 1</strong></td>
<td>26</td>
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<tr>
<td><strong>17. MILK PRICE PER CWT</strong></td>
<td>$12.19</td>
</tr>
<tr>
<td><strong>18. FEED COST PER CWT MILK PRODUCED</strong></td>
<td>$6.59</td>
</tr>
<tr>
<td><strong>19. SOMATIC CELL LINEAR SCORE</strong></td>
<td>3.2</td>
</tr>
<tr>
<td><strong>20. DAIRY’S MAXIMUM PREMIUM FOR QUALITY MILK</strong></td>
<td>$.15</td>
</tr>
<tr>
<td><strong>21. AMOUNT PREMIUM YOU RECEIVE (MINUS IF DEDUCT)</strong></td>
<td>$.05</td>
</tr>
<tr>
<td><strong>22. NUMBER OF PRODUCING FEMALES WITH PTA$ PROVEN SIRES</strong></td>
<td>62</td>
</tr>
<tr>
<td><strong>23. AVERAGE SIRE PTA$ OF PRODUCING COWS WITH PTA$</strong></td>
<td>135</td>
</tr>
<tr>
<td><strong>24. NUMBER OF PRODUCING COWS WITHOUT PTA$</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>25. BREED PREDICTED DOLLAR VALUE (ENTER CODE FOR BREED)</strong></td>
<td>4</td>
</tr>
</tbody>
</table>

1. AYRSHIRE
2. BROWN SWISS
3. GUERNSEY
4. HOLSTEIN
5. JERSEY
5. MILKING SHORTHORN
**KANSAS 4-H**

**ANALYZING DHIA RECORDS-THE DAIRY HERD ANALYZER**

**DAIRY CATTLE, LEVEL IV**

Member Handout 36, Dairy Herd Analyzer Expected Improvement (Sample)

<table>
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<tbody>
<tr>
<td><strong>Name:</strong> Dairy Producer</td>
</tr>
<tr>
<td><strong>Herd Code:</strong> 48-00=0000</td>
</tr>
</tbody>
</table>

---

**A. REPRODUCTION**

1. **$1/day over 365 days up to 395 days, then $3/day over 395 day calving interval.**
   - $23

2. **$3/day over 60 days or below 45 day average dry period.**
   - $27

3. **$2/each 0.1 service/conception over 1.7.**
   - $12

4. **$30/month/animal for each month over 24 months of age at first freshening.**
   - $23

   - **Reproductive Loss Per Cow: $85**
   - **Reproductive Loss for Herd: $6022**
   - **Conception % --- First Service:** 50%
   - **Conception % After 2nd Service:** 59%
   - **Heat Detection Efficiency (%):** 38%

---

**B. NUTRITION**

- **Nutritional Loss Per Cow: $161**
- **Nutritional Loss for Herd: $11460**

---

**C. MILK QUALITY**

1. **Price Milk/Lb. x Est. SCC Milk Loss x Cows**
   - $1320

2. **Cows x Lbs. Milk x Milk Quality Premium**
   - $1342

   - **Milk Quality Loss for Herd: $2662**

---

**D. GENETICS**

1. **Breed Average x 35% - Cows Sire Average/2**
   - $0.00

2. **Cows Without PTAs $ Sires x 35% Breed Avg PTAs**
   - $66.85

   - **Genetic Loss Per Herd: $602**

<table>
<thead>
<tr>
<th>Reproduction: $6022 Nutrition: $11460</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Quality: $2662 Genetics: $602</td>
</tr>
</tbody>
</table>

---

**Potential Improvement Per Cow**

Cow: 292

**Potential Improvement for Herd**

Herd: 20745

*153—Dairy Cattle, Level IV*
## Activity Sheet 10, Dairy Herd Analyzer Input

1. **DATE** ______________  **NAME:** _________________________________________
2. **HERD CODE** ........................................................................................ ______________
3. **ROLLING 365 DAY MILK AVERAGE** ................................................... ______________
4. **ROLLING 365 DAY FAT AVERAGE** ........................................................ ______________
5. **NUMBER OF PRODUCING FEMALES ON FARM** .................................. ______________
6. **DAYS MINIMUM FRESHENING INTERVAL** ........................................ ______________
7. **AVERAGE DAYS DRY** .......................................................................... ______________
8. **AVERAGE SERVICES PER CONCEPTION PRODUCING FEMALES** ........ ______________
9. **NUMBER OF PREGNANT COWS BRED ONCE** .................................... ______________
10. **NUMBER OF PREGNANT COWS BRED TWICE** ................................... ______________
11. **NUMBER PREGNANT COWS** .............................................................. ______________
12. **NUMBER COWS WITH BREEDING INTERVALS 18 TO 24 DAYS** ....... ______________
13. **NUMBER OF PG COWS WITH BREEDING INTERVALS >18 DAYS** .... ______________
14. **NUMBER OF PG COWS WITH BREEDING INTERVALS >24 DAYS** .... ______________
15. **NUMBER OF FEMALES—LACTATION 1** .............................................. ______________
16. **AVERAGE AGE (MONTHS) LACTATION 1** ......................................... (MONTHS) ______________
17. **MILK PRICE PER CWT** ........................................................................ ______________
18. **FEED COST PER CWT MILK PRODUCED** .......................................... ______________
19. **SOMATIC CELL LINEAR SCORE** ........................................................ ______________
20. **DAIRY’S MAXIMUM PREMIUM FOR QUALITY MILK** ......................... ______________
21. **AMOUNT PREMIUM YOU RECEIVE (MINUS IF DEDUCT)** ................ ______________
22. **NUMBER OF PRODUCING FEMALES WITH PTA$ PROVEN SIRES** .... ______________
23. **AVERAGE SIRE PTA$ OF PRODUCING COWS WITH PTA$** ........... ______________
24. **NUMBER OF PRODUCING COWS WITHOUT PTA$** ............................ ______________
25. **BREED PREDICTED DOLLAR VALUE (ENTER CODE FOR BREED)** .... ______________

1. **AYRSHIRE**  
2. **BROWN SWISS**  
3. **GUERNSEY**  
4. **HOLSTEIN**  
5. **JERSEY**  
5. **MILKING SHORTHORN**
### Stage of Lactation Profile

<table>
<thead>
<tr>
<th>DAYS IN MILK</th>
<th>&lt; 50</th>
<th>50 - 100</th>
<th>101 - 200</th>
<th>201 - 300</th>
<th>300+</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>First</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Lactation</td>
<td>80.5</td>
<td>85.0</td>
<td>73.0</td>
<td>64.0</td>
<td>76.3</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Lactation</td>
<td>80.5</td>
<td>85.0</td>
<td>73.0</td>
<td>64.0</td>
<td>76.3</td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Dairy Milk LBS</td>
<td>103.3</td>
<td>124.5</td>
<td>95.0</td>
<td>60.0</td>
<td>32.0</td>
<td></td>
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<tr>
<td>Other</td>
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<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Lactation</td>
<td>80.5</td>
<td>85.0</td>
<td>73.0</td>
<td>64.0</td>
<td>76.3</td>
<td></td>
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<tr>
<td>Animals</td>
<td>103.3</td>
<td>124.5</td>
<td>95.0</td>
<td>60.0</td>
<td>32.0</td>
<td></td>
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<tr>
<td>Dairy Milk LBS</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>All</td>
<td>86</td>
<td>94</td>
<td>101</td>
<td>95</td>
<td>96.4</td>
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<tr>
<td>Milking</td>
<td>93.1</td>
<td>104.8</td>
<td>89.1</td>
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<td>58.8</td>
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<tr>
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<td>4</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Dairy Milk LBS</td>
<td>216.3</td>
<td>213</td>
<td>324</td>
<td>81</td>
<td>509</td>
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<tr>
<td>Percent Above 400,000</td>
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<td>25</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td></td>
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</table>

### Feeds Reported on Sample Day

<table>
<thead>
<tr>
<th>Feed Name</th>
<th>$/ton or $/Mile</th>
<th>Pounds Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrates</td>
<td>135</td>
<td>10</td>
</tr>
<tr>
<td>Corn Silage</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>99</td>
<td>15</td>
</tr>
<tr>
<td>Dry Hay</td>
<td>80</td>
<td>30</td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>Topdress</td>
<td>2</td>
<td>237</td>
</tr>
<tr>
<td>39 Cotton Seed</td>
<td>157</td>
<td>2</td>
</tr>
<tr>
<td>SoY Bean Meal</td>
<td>190</td>
<td>2</td>
</tr>
</tbody>
</table>

### Birth and Inventory Summary

- **Offspring Born**
  - Dam's Last Number
  - Males: 10
  - Females: 2
  - Calving Difficulty Score
  - Alive: 3
  - Dead: 2

### Cost and Return Summary

<table>
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<th>DOLLARS PER COW ON SAMPLE DAY</th>
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<td>Feed Cost / CWT Milk</td>
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<td>Return / $ Feed Cost</td>
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### Feed Summary

- **Dry Hay**: 3,548
- **Corn Silage**: 10,572
- **Haylage**: 2,901
- **Concentrate**: 9,313

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<th>FEED TYPE</th>
<th>Annual LBS/Cow</th>
<th>LBS/Cow or Days/Cow</th>
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### Analyzing DHIA Records - The Dairy Herd Analyzer

#### 365 Day Culling Summary

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#### Lactation Summary

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**Total**

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**Average**

14 | 1004 | 30

#### Production Summary

<table>
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<th>Sample Day</th>
<th>Days to Test Period</th>
<th>% Milk Shipped</th>
<th>Products of Animals on Farm</th>
<th>% Milk in Milk Level</th>
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<th>Fat</th>
<th>Protein</th>
<th>Milk</th>
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**Totals and Average of 12 Tests**

Cow Years: 33.08
ANALYZING DHIA RECORDS-THE DAIRY HERD ANALYZER
DAIRY CATTLE, LEVEL IV
Member Handout 38, Dairy Herd Analyzer Standard Recommendations

REPRODUCTION
1. Intensify heat detection and use 21-day repro-calendar.
2. Breed cows at first heat after 42 days in milk.
3. Synchronize cows with good C.L. not bred by 60 days and cows open at PG check.
4. Inject repeat breeders with CYSTORELIN or FACTREL at time of 3rd or 4th service.
5. Establish a Preventive Herd Health Program (PHHP) with veterinarian with regular exams.
6. Provide a 60-day dry period.
7. Follow sound AI techniques.
8. Feed replacements to freshen at 24 mo.

NUTRITION
1. Follow good dry cow feeding program.
2. Adjust springers to lactating cow ration 2 wk before due date and feed grain @ 1% of body wt.
3. Challenge all cows with high energy-protein ration within 2-3 days after calving.
4. Buffer high energy rations.
5. Balance rations according to stage of lactation.
7. Cull low producers.

MILK QUALITY
1. Practice good udder prep procedures—predipping is recommended—dry teats thoroughly with individual towel.
2. Attach claw within one minute from start of prep.
3. Detach claw when milking is completed. Shut off vacuum before detaching.
4. Use effective teat dip after milking.
5. Follow routine machine maintenance schedule.
6. Keep lots and housing clean and dry.
8. Culture bulk tank for antibiotic sensitivity every 6 months.
9. At dry off, treat every cow with an effective antibiotic.
10. Prepartum milk cows and heifers with excessive edema or mastitis.
11. Use DHIA SCC Report for mastitis control evaluation.

GENETICS
1. Commit to a total AI program.
2. Select sires in upper 80 percentile.
3. Breed all heifers to AI calving ease bulls.
4. Consult AI reps to mate cows to correct weaknesses.