



DAIRY

Project Guide

4-H
Alberta

www.4h.ab.ca

Alberta
Government



THE 4-H MOTTO

"Learn To Do By Doing."

THE 4-H PLEDGE

I pledge:

My **Head** to clearer thinking
My **Heart** to greater loyalty
My **Hands** to larger service
My **Health** to better living
For my club, my community and my country.

We gratefully acknowledge the support of



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The 4-H Grace

(Tune of Auld Lang Syne)

We thank thee, Lord, for blessings great
on this, our own fair land.
Teach us to serve thee joyfully,
with head, heart, health and hand.

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WELCOME TO THE 4-H ALBERTA DAIRY PROJECT!

4-H is a program for youth, which also involves adult volunteers, parents and guardians, and the community. The aim of 4-H is to develop your skills, knowledge and attitudes in the spirit of fun and friendship.

The goal of this book is to give you an introduction to the 4-H program, the dairy industry and have some fun along the way. 4-H is a great way to meet people with similar interests, be involved as a volunteer, and work closely with animals.

OBJECTIVES OF THE 4-H DAIRY PROJECT

- Develop an appreciation of dairy animals.
- Members will learn to care for dairy animals through all phases of their lives, including birth, calf, heifer, calving, dry and lactating cow stages.
- Learn about the different facets of care provided to animals related to housing and equipment, feeding, milk production, health, reproduction, and other aspects of herd management that together form a successful operation.
- Members showing project dairy animals as an element of their project will learn about preparing animals for shows, as well as showring practices and procedures.
- Members will be introduced to modern aspects of the dairy industry, including trends in feeding, milking equipment, and marketing strategies that are present in the Canadian dairy industry.
- Learn in a fun, comfortable, interactive and hands-on environment, developing life skills relating to the goals of the 4-H program and the 4 H's - Head, Heart, Hands and Health.

HOW TO USE THIS PROJECT GUIDE

The 4-H Dairy Project Guide consists of three separate booklets for use by 4-H Dairy project leaders and members:

1. **Project Guide** – This guide contains several sections to provide information on different aspects of care and management of dairy cattle, including:
 - General Information
 - Health
 - Breeding and Reproduction
 - Nutrition
 - Housing, Equipment and the Environment
 - Milk Production and Marketing
 - Managing the Farm Business

At the end of each section there is a list of resources used in that section. Volunteers may find these resources useful in providing supplemental information to enhance the Dairy project. A topical glossary (Vo-Cow-bulary) is also included for use in activities, or member reference.

2. **Leader's Guide** – This guide contains activities to complement each of the resource topics covered in the Project Guide, and is organized in the same sectional order as the Project Guide.

At the beginning of each section of the Activity Guide there is a list of roll call suggestions, potential guest speakers for the topic, and a list of take home assignments that members could be asked to complete, on their own. Most activities are broken down into various components to assist the leader in organizing the activities: Purpose, Age Group, Time Allotted, Preparation and Equipment, Instructions and Debrief.

3. **Record Book** – This book is designed for members to record information on their project animal and other club activities. Heifer record keeping worksheets are included for those keeping their project animal past Achievement Day.

To prepare manuals for the members:

- Decide which topics and activities you would like to use to make the Dairy project suitable for your members. There are many topics covered so that different ones can be selected each year to keep the project new and interesting for returning members.
- Print or photocopy the Resource pages, parts of the record book, and activity sheets that you require. Distribute the material as a complete booklet at the beginning of the club year or as smaller units at each meeting.
- When facilitating this project for the first time, keep track of what went well, and what you would change for the next time because each time the project is taught, the content of the meetings can be different!

As a club volunteer, your responsibilities are to:

- Have membership lists completed and submitted along with fees collected (if applicable) by the end of the second meeting.
- Review project material in the Project and Leader's Guides to familiarize yourself with the information and adapt it to fit your group - **be well organized, and teach the material based on your group's age, interest, and experience level.**
- Arrange a meeting schedule, participate in club meetings, the achievement program and other club activities.
- Complete the volunteer screening process and attend a volunteer training session.

As a club member your responsibilities are to:

- Attend a minimum of 70 percent of club activities.
- Participate in a communications activity (i.e. speech, presentation etc.).
- Complete a project record book.
- Participate in your club's Achievement Day.
- Complete a community service activity.

Achievement Day

While most dairy clubs have a calf show as their final achievement project, it is not mandatory that 4-H dairy members show a calf to complete the Dairy project. Before the club begins, leaders must decide whether members will be showing animals or not. All club members should be fulfilling the same requirements to complete the individual club.

If you are running a dairy club that will not be using 4-H project animals, members can be asked to complete a different type of project to be granted a project completion. At the beginning of each section of the Activity Guide is a list of Take Home ideas or assignments, many of which can be adapted to be a project for club completion.

GENERAL VO-COW-BULARY

(Source of some definitions: Ontario Farm Animal Council's Virtual Farm Tours DVD)

Insemination, Artificial (AI)	The use of frozen semen from selected bulls to breed dairy cows. It allows farmers to use top genetics from selected bulls to improve each generation of dairy cows.
Bedding	Material such as straw, wood chips or sand that is used as cushion for animal comfort. This bedding often covers a mattress made of recycled rubber tires.
Biosecurity	Method used to protect the herd against the introduction or spread of disease.
Bulk Tank	A refrigerated stainless steel storage unit where milk is cooled quickly to 1°C - 4°C (35° F to 39° F) and stored.
Bull	An uncastrated male bovine.
Calf	A newborn bovine. The plural of calf is "calves".
Colostrum	The first milk produced by the mammary gland of a cow after calving. It is a rich source of nutrients, fats and antibodies. Feeding colostrum to the calf is critical in the first hours of life as it provides essential nutrients and infection-fighting antibodies to the newborn.
Cow	A mature female bovine that has given birth at least once.
Crossbreed	An animal whose dam and sire were from different breeds.
Dam	The female parent of an animal.
Dry cow	A cow that is waiting to give birth and is not producing milk.
Free stall barn	The cows are housed in large group pens or individual stalls without being tied. In order to access water and feed in specific places, the cows are loose in the barn. They get milked by walking to a milking parlour or a milking robot.
Freemartin	A heifer who has been born as a twin with a bull and is unable to breed due to the transfer of hormones between bull and heifer inside the uterus during the gestation period.
Gestation Period	The time that a cow is pregnant, ranging from 279 to 290 days.
HACCP	This acronym stands for Hazard Analysis Critical Control Point (HACCP). This is a quality assurance program that identifies risk factors (critical points) as a means of reducing them to an absolute minimum. Dairy Farmers of Canada has developed an on-farm food safety program called Canadian Quality Milk (CQM), which is recognized by the Canadian Food Inspection Agency.

Heifer	A young female that has not yet had a calf.
Lactation	The secretion of milk by the mammary glands. A cow produces milk only after it has calved. The lactation period lasts about ten months.
Nutrient	Any chemical element or compound essential for the growth and development of an organism.
Nutrient management	Matching the nutrients in manure and fertilizer to crop requirements in an environmentally friendly way.
Registered	A cow that has registration papers to prove her parentage.
Milk house	A section of the barn that houses the milking and sanitizing equipment as well as the bulk tank, in which the milk is stored and cooled.
Milking	The action of obtaining milk from a cow's udder with a milking machine.
Milking machine	Machine to obtain milk.
Milking parlour	A cow walks onto a raised platform with gates, which keep the animal from moving while she is being milked. The milk goes directly from the milking machine through a pipeline to the bulk tank in the milk house. When milking is over, the cow walks out.
Milking System - Robotic	This is similar to a parlour system, except that the entire milking system is automated. Cows can enter the robot at anytime during the day to be milked. This technology is still new to North America.
Milking System - Tie stall	In this type of barn, the cows are tied in stalls next to each other. They have constant access to water and are fed in a manger in front of them. The cows are milked in their stall.
Milk replacer	Mainly made of high quality milk products such as dried skim milk, dried whey and dried buttermilk. Milk replacer can be used by a farmer to improve feed intake and growth of the young calf.
Pipeline	Glass or stainless steel pipe that collects the milk from the milking machines and brings it to the bulk tank.
Purebred	A cow whose dam and sire were both of the same breed.
Ruminant	A herbivorous animal that swallows its food un-chewed and regurgitates it in a semi-digested form (known as cud) for chewing. This process is called rumination. Ruminants have a stomach divided into four compartments that allows them to digest plants high in fibre like grass. Cows, goat, sheep, lamas, bison, buffalo, elk and deer are ruminants.

Silage	Made of grasses (e.g. hay), legumes (e.g. alfalfa) or corn, which are chopped and stored in a silo while still moist.
Silo	Silos are extremely useful to store a wide variety of livestock feeds, including silage. A silo can be vertical (like a tower) or horizontal (called a bunker).
Sire	The male parent of an animal.
Slatted floor	A floor with open spaces to allow evacuation of manure.
Steer	A castrated male bovine.
Transponder tag	A tag with a computer chip that identifies an animal and transmits information about its feed intake or milk output to the computer (for statistical purposes).
Udder	The udder is the mammary organ that secretes the cow's milk. The udder has four teats.
Ventilation	Ventilation is extremely important in dairy barns as cows need to have access to fresh air, year-round. There are several types of ventilation systems that are adaptable to the change in seasons.

REFERENCES AND RESOURCES

Holstein Canada. "Good Show Ethics Begin with Young Adults" www.holstein.ca

Holstein Canada. "Preparing to Lead" www.holstein.ca.

Holstein Canada. "Showmanship...Leading to Win" www.holstein.ca.

Holstein Canada. "You Be the Judge" www.holstein.ca.

Manitoba 4-H Dairy Manual - Junior, Intermediate, Senior and Record Books, Drafts 2000.

Previous editions of the 4-H Ontario Dairy Manual.

JUDGING

Judging is an activity that many 4-H clubs do. If you take the time to learn a few basic steps judging can be an enjoyable and challenging activity.

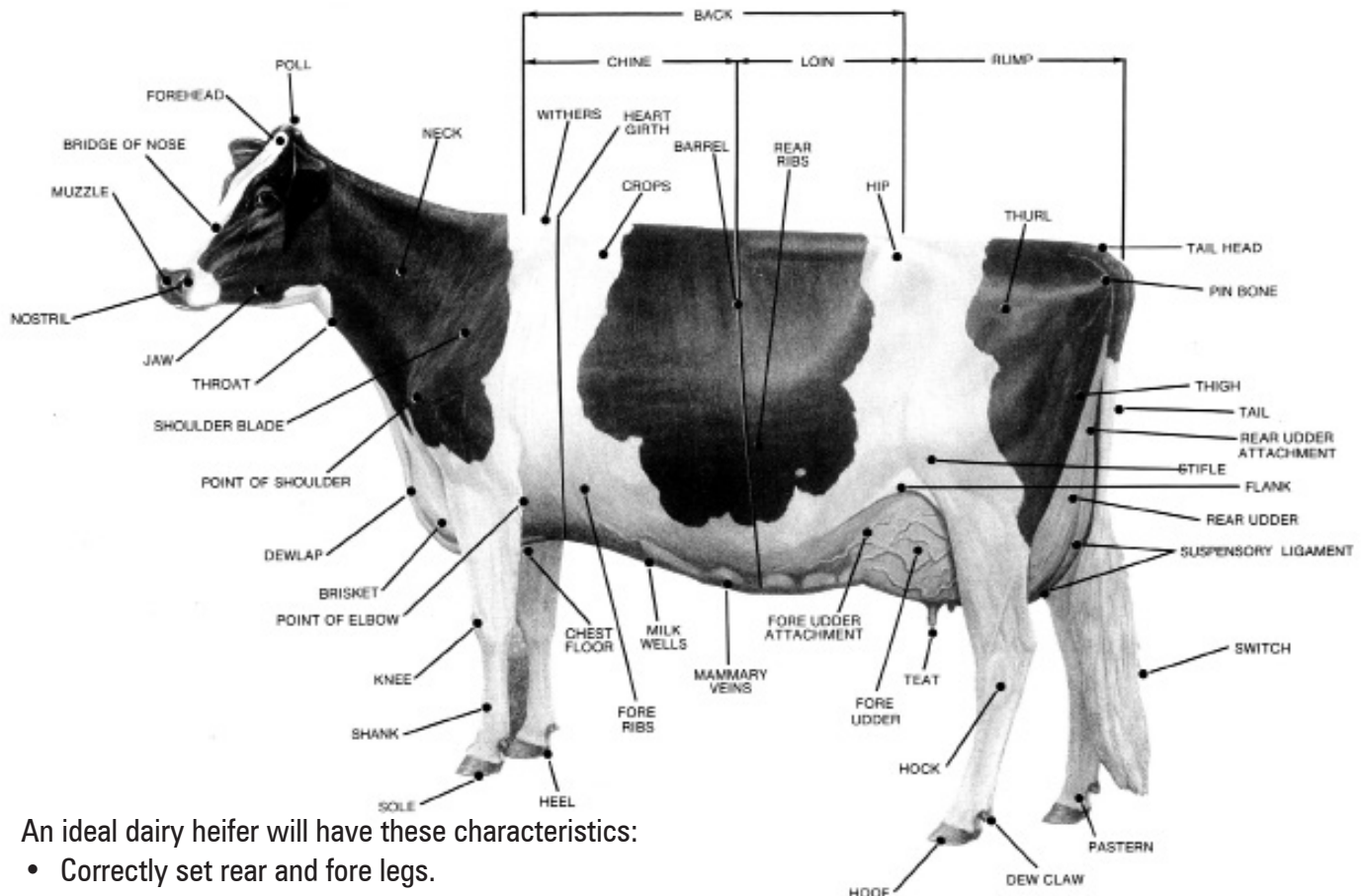
Why do we judge in 4-H?

There is so much more to judging than simply putting animals or items in the same order as the official judge. Judging in 4-H helps us to:

- Develop Confidence
- Communicate
- Make Decisions
- Evaluate
- Learn

LEARN THE PARTS OF THE COW

In order to judge dairy cattle, or even to work with them every day, it is very important to know the parts of the animal. Let's take a look at what makes the "ideal" cow.



An ideal dairy heifer will have these characteristics:

- Correctly set rear and fore legs.
- Tall, upstanding and stylish.
- Adequate strength and capacity.
- Straight and smooth over the topline.
- Level and wide in the rump.
- Smoothly blended and proportionate body parts.
- Sharp and clean over shoulders and withers.

DAIRY COW SCORE CARD

Once you know the parts of the body, the next step to becoming a successful dairy judge is to learn what the ideal animal looks like. In this section, we will work through the parts of a dairy cow and learn the desirable and undesirable characteristics.

When you judge, do not assign numerical scores. Use the card for relative emphasis only. When cows are classified by the official breed classifiers, classifications and absolute scores are assigned.

Canadian Holstein Cow Score Card

	<i>Perfect Score</i>
1. Mammary System	40
2. Dairy Strength	25
3. Feet and Legs	25
4. Rump	10
Total	100

Canadian Jersey Cow Score Card

	<i>Perfect Score</i>
1. Capacity	17
2. Rump	10
3. Feet and Legs	14
4. Mammary System	16
5. Dairy Character	17
6. Fore Udder	10
7. Rear Udder	16
Total	100

As you can see, the score cards for each of the different breeds differs slightly. The individual characteristics looked for by each of the breeds is the same, they just place different emphasis on the component parts. Because Holsteins are the predominant breed in Canada, the following information will be based on the Holstein Score Card.

Mammary System

"A strongly attached, well balanced, level udder of fine texture indicating heavy production and a long period of usefulness."

The mammary system accounts for 40% of the relative merit, making it the single most important part of the dairy cow. This should be no surprise as the most important economic function of the dairy cow is milk production.

The mammary system includes all of the parts of the body of the dairy cow that have a role to play in the production of milk. Each individual part has its own function and its own specific desirable qualities.

The udder should be symmetrical and well balanced with evenness of all four quarters. It should be securely attached to the body and be capacious, but not necessarily large. This will give the udder a "milky" appearance.



Excellent Udder



Tilted Udder

Udder

- Symmetrical of moderate length, width and depth.
- Slight quartering on sides.

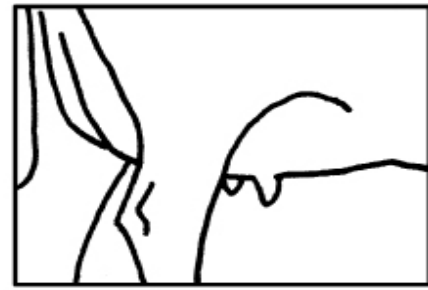
The udder should be of intermediate depth. The udder should never hang below the hocks of a cow of any age.



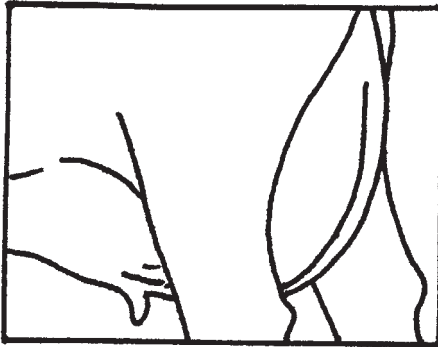
**Extremely deep udder,
hangs below hocks**



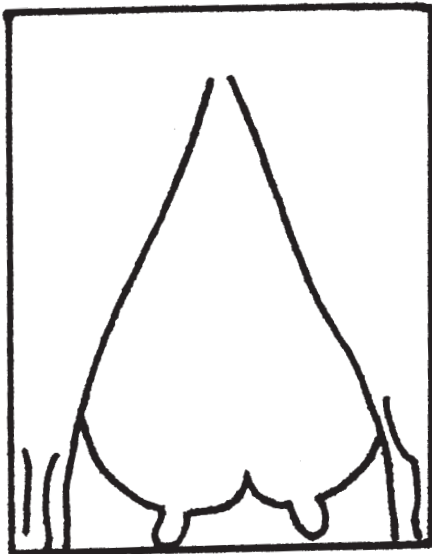
**Udder floor level with
hocks**



**Extremely shallow
udder**



Desirable fore udder



Low, narrow rear udder attachment



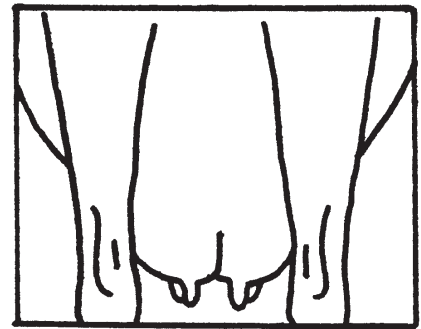
Rear udder tucked inward limiting rear udder capacity

The Median Suspensory Ligament is the strong supportive ligament that runs lengthwise through the center of the udder. It should be strong but not overly tight, giving a definite cleavage or crease between the halves of the udder. If this ligament is not strong enough, the floor of the udder will bottom out, causing the udder to weaken and the teats to point outward.

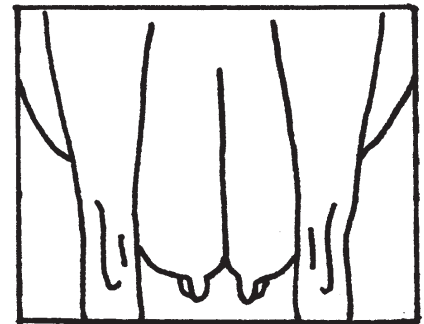
Udder texture should always be soft, pliable and elastic. After milking, the udder should be well collapsed.

The Fore Udder is composed of the front parts of the udder. The most important characteristic to look for is the moderately long, firm and smooth attachment of the fore udder to the body wall. A longer fore udder attachment provides for a more capacious udder. With a well attached fore udder and a strong median suspensory ligament, the quarters will be evenly balanced. A strong fore udder attachment corresponds to a longer lasting dairy cow.

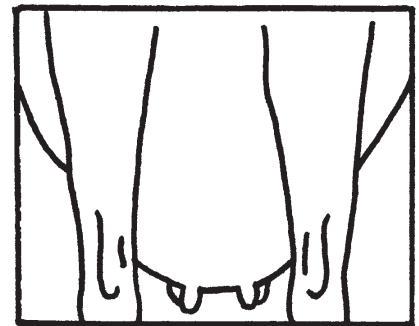
There should be four fully functional teats of uniform size and medium length and diameter. The teats should be cylindrical and plump and should hang perpendicular to the floor of the udder. From a side view, the teats are placed in the center of each quarter. From a rear view, the teats are slightly closer to the inside than the outside of each quarter.



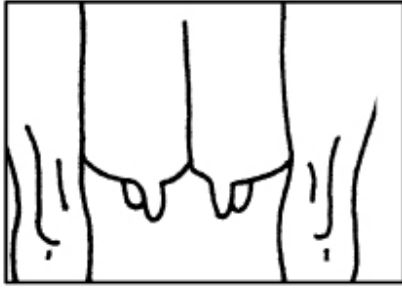
Udder with excellent median suspensory ligament.



Udder with extreme cleft of median suspensory ligament.



Udder with poor or broken median suspensory ligament. Udder bottoms out.



Ideal udder with 4 evenly placed teats



Teats too long

The Mammary Veins should be long, tortuous (winding) and branching. Prominent udder veining, although it is attractive, is not associated with higher milking ability.

Dairy Strength

Dairy Strength makes up 25% of the Holstein score card.

"Evidence of milking ability, angularity, and general openness, without weakness; freedom from coarseness, giving due regard to stage of lactation. With attractive individuality indicating vigour, strength, stretch, size and stature with harmonious blending and proportional balance of parts; head indicating femininity with adequate strength, mid-section relatively large providing ample capacity."

Holstein Cow

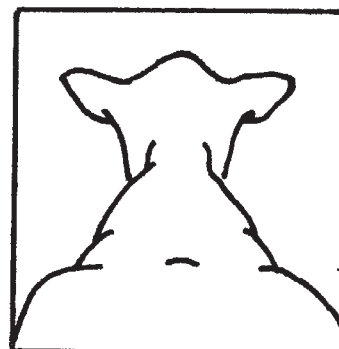
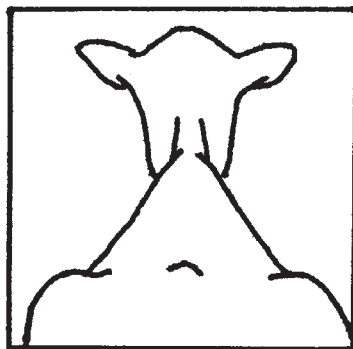
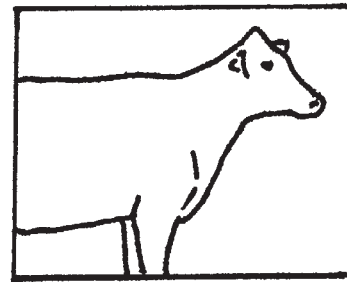
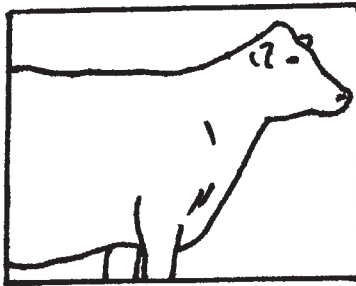
Height - 1.5 meters or 58 inches

Weight - 680 kg or 1500 pounds

Jersey Cow

Height - 1.3 meters or 52 inches

Weight - 450 kg or 1000 pounds



**Desirable dairy character
(side and top view)**

**Undesirable dairy character
(side and top view)**

Head

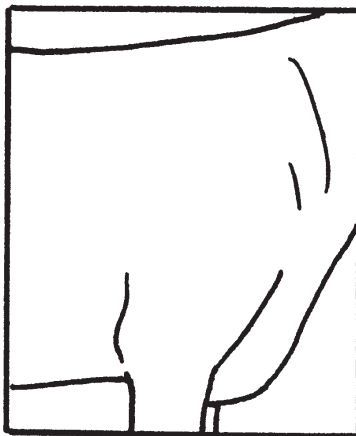
- Clean cut and feminine.
- Eyes large and bright.
- Ears carried alertly resulting in a head with character appropriate for the breed.
- Broad muzzle with large, open nostrils.
- Jaws meet properly without overlap.
- Strong lower jaw.
- Broad forehead.

Neck

- Long, lean and clean.
- Blending smoothly into the shoulder.
- Clean about the throat, dewlap and brisket.



**Ideal dairy neck
and shoulders**



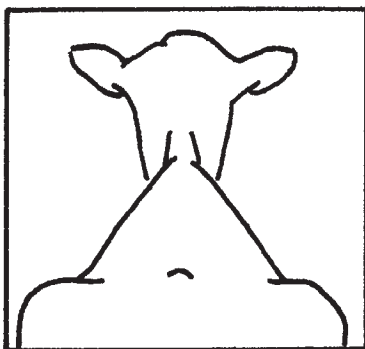
**Coarse shoulders,
throaty**



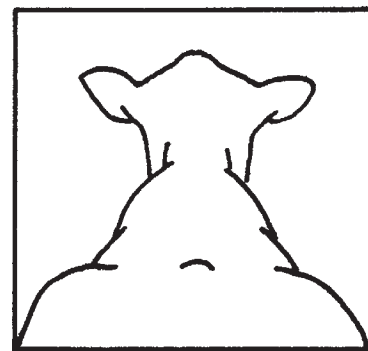
Winged shoulders

Withers

- Well-defined, prominent and wedge shaped.
- Dorsal process of vertebrae rise sharply above shoulder blades.



**Desirable Withers
well defined**



**Undesirable withers
overconditioned**

Ribs

- Wide apart.
- Rib bones are wide, flat and long.

Flanks

- Deep and refined.

Thighs

- Incurving to flat from side view.
- From the rear view, wide apart, providing ample room for the udder and its rear attachment.

Udder

- Soft and pliable in texture.
- Free from excess tissue or edema (hardness or swelling in the udder).

Bone

- Flat, strong and clean cut.

Be Aware

Stage of lactation affects the appearance of the dairy character of the cow. A cow that has freshened two months prior will show more dairy character than a similar cow that has been milking for nine months. As the cow progresses in her lactation, she will carry more condition. Take this into consideration when you are judging dairy cattle.

Cows that are too dairy may be frail. There is a point where a cow lacks the strength to produce. A cow with good dairy character will also be strong.

Shoulder Blades

- Set smoothly against the chest wall and withers.
- Form neat junction with the body.

Chest

- Wide floor, resulting in ample width between the legs.
- Well-filled.
- Desirable width and power through chest.
- Narrow and pinched through the chest.

Heart Girth

- Large and deep.
- Full at the elbows with well sprung fore ribs.
- Fore ribs blend smoothly into the shoulders.

Crops

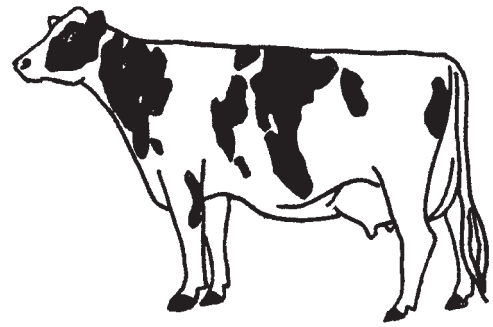
- Well-filled.

Back

- Strong and straight.
- Vertebrae are well-defined.

Loin

- Broad and slightly arched.
- Vertebrae are well defined.
- Attachment to hip bones is high and wide.

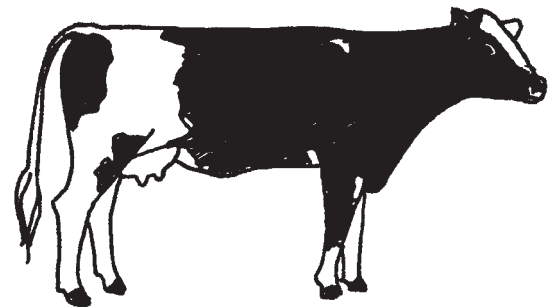


Desirable Body Capacity
 – deep through the heart
 – back strong and straight
 – broad, strong loin
 – ribs high and wide

Mid-section

- Long ribs highly and widely sprung.
- Depth and width of ribs tending to increase towards the rear.

Note: Look at body capacity as being three dimensional. Always consider the length, depth and width of the dairy animal.



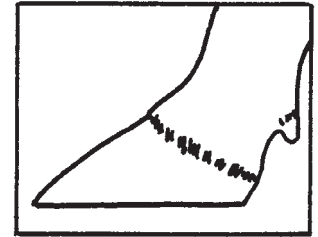
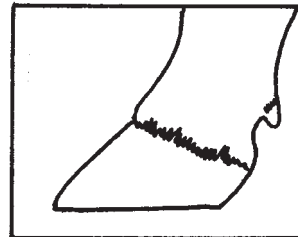
Undesirable Body Capacity
 – shallow through the heart
 – back fleshed
 – weak over the loin
 – narrow ribbed

Feet and Legs

- “Clean and strong boned, with shape and movement of feet and legs resulting in proper carriage of the animal.”
- Feet and legs make up 25% of the score on the Holstein Score Card. When evaluating feet and legs, check for the following:

Feet

- Short and well rounded, with deep heel.
- Toes slightly spaced.

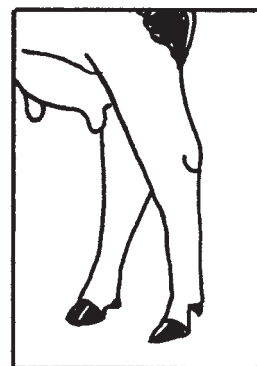


Short, strong pasterns
 Good depth of heel,
 Proper Angle

Long, weak pasterns
 Shallow heel
 Low Angle

Legs

- Pasterns strong, of medium length and flexible.
- Forelegs straight and wide apart with feet squarely placed.
- Hind legs nearly perpendicular from hock to pastern from side view.



Ideal Rear Legs

Sickle Hocked

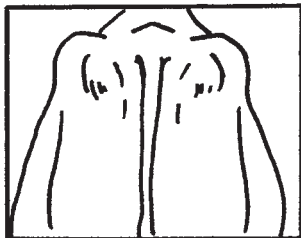
Post Legged

Cow Hocked

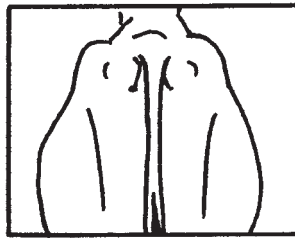
- Straight and wide apart from the rear view.
- Hocks cleanly molded.
- Bone flat, strong and flinty, with tendons well-defined.

Rump

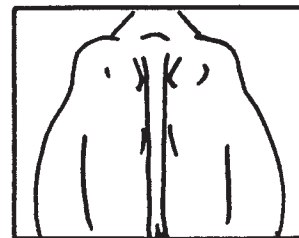
- “Long, wide and clean cut, blending desirably with the loin.”
- Rump accounts for 10% of the Holstein score card. The characteristics which should be evaluated when examining the rump are:



Extreme Width of Rump



Extremely Narrow Rump



Intermediate Width of Rump

Hip or Hooks

- Wide, but not prominent.
- Slightly higher than the pins.

Pins

- Wide apart and free from patchiness.
- Slightly lower set than hip or hooks.

Thurls

- High and wide apart.
- Give consideration to the stage of lactation.
- closer to a line drawn vertically from the hook is more desirable.



Nearly level Pelvic Angle
– pins slightly lower than hooks

Tailhead

- Refined.
- Carrying out level with the backline.
- Set slightly higher than the pins.



Severe slope
– pins set extremely below hooks

Tail

- Long and slender.

Pelvic Angle

- Moderately sloped with pins set slightly lower than the hooks.



Pins set higher than hocks
– undesirable

Note: It is your responsibility as a judge to be able to identify these faults.

Relative Emphasis

Feet and Legs.....	35
Dairy Strength.....	50
Rump.....	15
Total	100

Steps in Placing a Class

- 4-H judging classes will always have 4 articles to compare.
- They will be numbered from 1 to 4, left to right when viewed from behind in livestock classes.
- Read the class title correctly; it will give you clues for points to consider. (Mature cows will look different than first-calvers, etc.)
- Learn and practice using the correct terms of the articles that you will be judging. (Pin bones, flat boned, angular, upstanding, etc . . .)

Reasons

Reasons give you a chance to justify your placings. By practicing judging and reasons regularly, you will soon develop a good system for judging, and be able to justify your placings with your reasons. As you get comfortable with your reasons, you may want to try to do a few things differently. Making some basic changes to the format of your reasons will make them easier to listen to and will make you sound more professional.

Structure

Good reasons have a specific structure. Whether you are presenting written or oral reasons, you should follow the same format. Reasons should have three parts: an introduction, a body and a conclusion. Let's look at each of these.

The Introduction

The introduction to your reasons should be a simple statement telling the listener two things:

- The class you judged.
- Your placing of the class.

An example of an acceptable introductory statement is: *"I placed this class of 2-year old Holstein Cows 3, 1, 2, 4."*

Notice that the classes are not just called "cows" but "2-year old Holstein Cows." You may vary the statement slightly as you become a more experienced judge. Just remember to identify the class you judged, and include how you placed the class.

The Body

The body will be the most detailed part of your reasons; therefore, you should spend the most time preparing this section. As you become more experienced with judging, you will want to become more mindful of organizing the body of your reasons in a logical order so that your reasons are easier to follow for the person marking them. For example, you can start at the head and work to the tail, go from top to bottom, or if you are judging something where there is a standard scorecard, you can start with the section of the scorecard that has the most. Here are some hints to help make the preparation of your reasons a little easier:

- Do your analysis in pairs. There are three pairs in your reasons - a top, middle and bottom pair.
- Be comparative. It is not acceptable that you simply describe the animals or items in the class. You must use comparative terms. Words ending with “-er” and phrases beginning with “more” are ways to make your reasons comparative.
- Make sure that all the information you provide in your reasons is true and accurate for the class. You will lose marks for wrong information.
- State your most important points first, then go on to your less important points.
- Follow a logical pattern on each animal or item. Head to tail, top to bottom, or most important to least important points.
- Be thorough in your reasons. Make sure you mention all of the points that you consider to be important.
- There are words you should never use in your reasons. They include “good”, “better”, “best” and “nice”. These words are not specific enough about what you appreciate about that entry.
- Try to avoid repeating words or phrases.
- Use the correct terms for the items or animals you are judging. Know the meaning of the terms you are using.
- Be positive. State the advantages one animal has over the other animal rather than pointing out the weak points of the lower placed animal. Avoid being negative.
- Grant when the lower animal of the pair has an advantage over the upper animal of the pair. Keep your grants short and simple.
- Be organized. If you can show the judge that you are organized in your judging and your reasons, you will appear more knowledgeable.
- If a placing is close, say so.
- Be concise. If possible, get your point across in a few words rather than many words. For example, “4 is wider from pin to pin”.
- Avoid using “he”, “she” or “it”. Refer to the animals or items by their number without saying “number 4”. Refer to the entry as “4”.

The Conclusion

The conclusion of your reasons should be a simple statement summarizing the information from your introductory statement. Again, give a complete and correct identification of the class that you are giving reasons on and placing.

An example of an acceptable concluding statement is: *“For these reasons, I placed this class of 2-year old Holstein Cows 3, 1, 2, 4.”*

Again, once you become more experienced, you may wish to vary your concluding statement slightly.

Review of Reasons

In review, as a beginner judge, your reasons should have a basic structure like this:

I placed this class of insert name of class here 3, 1, 2, 4.

I placed 3 over 1 because . . .

-

-

-

I placed 1 over 2 because . . .

-

-

-

I placed 2 over 4 because . . .

-

-

For these reasons, I placed this class of insert name of class here 3, 1, 2, 4.

Beginner judges can start with one point per pair and as you become more experienced you will add more points to each pair. As you become more experienced, you will begin to add to this general structure.

For example, in your opening statement, you could add a combination statement that sums up the priority used to judge the class or to describe the class winner.

Examples are:

"I started the class with the heifer that exhibits the most muscling and balance," or "I found that this class split itself into two pairs. A top pair that showed more balance and muscle, and a bottom pair."

As a more experienced judge, another change that you should make to your oral reason presentations is that as you begin to talk about each of the pairs that make up the body of your reasons, try starting each paragraph with something other than "I placed 2 over 3." These statements are lead-in statements.

Some example ways to start your paragraphs include:

"Drawing your attention to my initial pair, I preferred 3 over 4," or "In reference to my middle pair, I selected 4 over 2."

Presenting Your Oral Reasons

The general rules for written and oral reasons are the same. In both, you must provide a good presentation. It is your method of presentation, that differs.

Follow these rules when presenting your oral reasons:

- Speak clearly and loud enough to be easily heard.
- Be pleasant.
- Convince the judge that your reasons are right.
- Be confident in your reasons.
- Emphasize your most important points.
- Avoid reading your notes.
- Have a picture of the class in your mind.
- Look your judge in the eye.
- Stand straight - don't fidget.
- Relax and have fun!

You be the JUDGE



Your Guide to Judging Dairy Cattle

Whether you're a 4-H member, a progressive milk producer, or an official judge, at some time you'll be assessing and comparing one animal to another, either your barn or at a show. And regardless of the number—4, 10, or 20, you'll need to sort the desirable from the less desirable animals.

At that time ... you will be the judge!

A ***You Be the Judge*** video to complement this manual is available. Other show-related manuals and videos have been produced in English, French, and Spanish. International video formats: NTSC, PAL, SECAM.

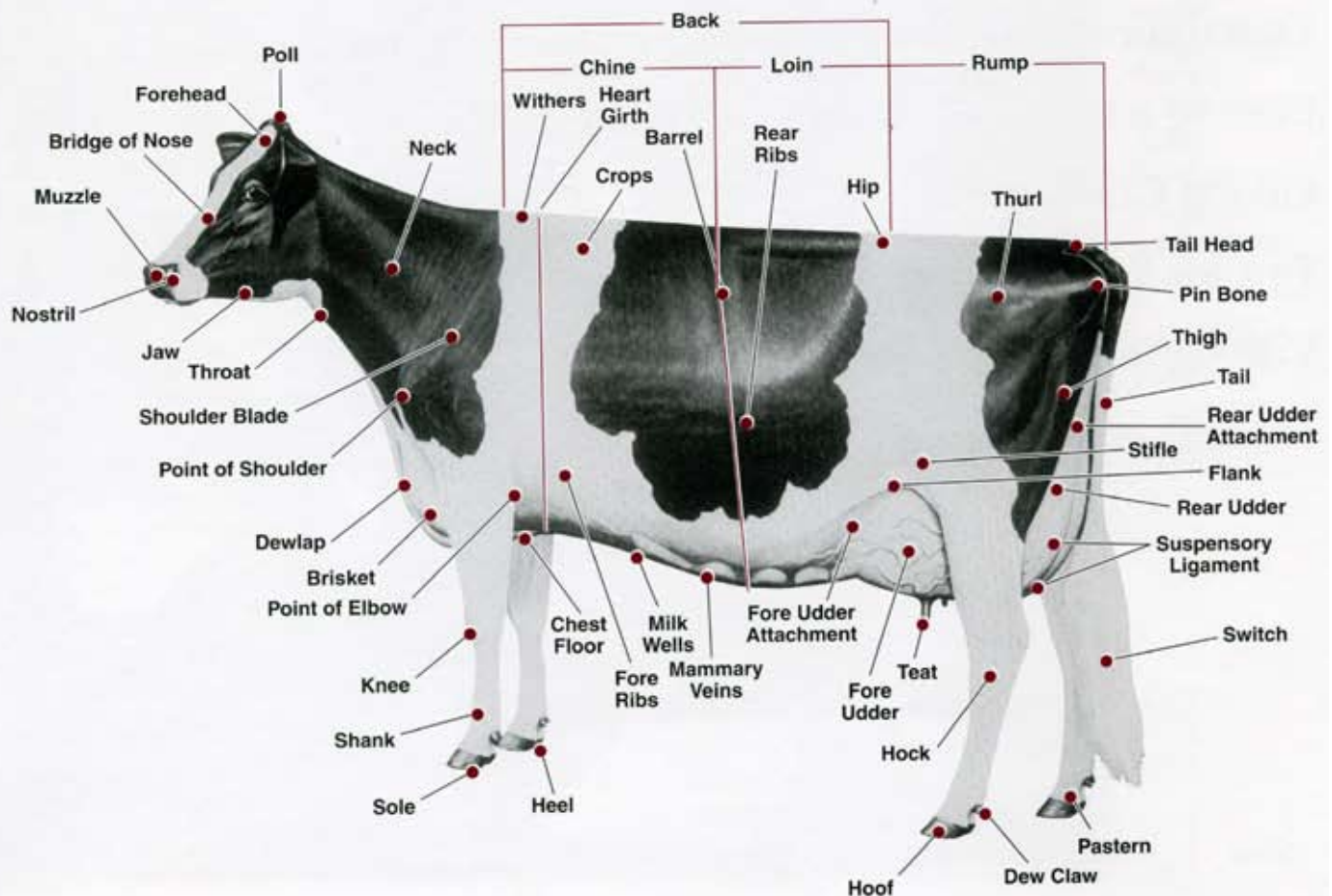
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2

Parts of the True Type Dairy Cow

Before you begin assessing and comparing animals, you must know the parts of the true type cow.

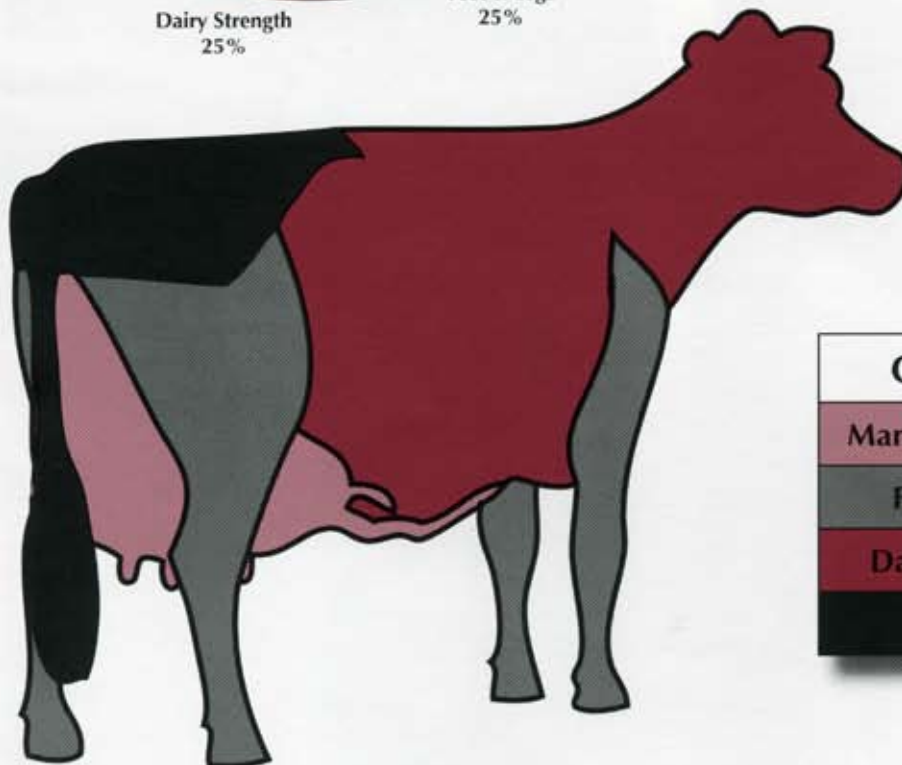
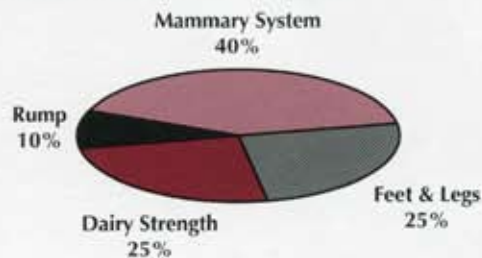


Relative Emphasis for Cows

In Canada, both the judging and classification programs use the Holstein Cow Score Card as a guide. While **classification** is the evaluation of each animal individually, compared to the true type, **judging** is the comparing of each animal to others.

The relative emphasis placed on individual parts is indicated in the chart. While used as a guide, numerical points are not assigned in judging.

Relative emphasis for cows:



Cow Scorecard

Mammary System - 40%

Feet & Legs - 25%

Dairy Strength - 25%

Rump - 10%

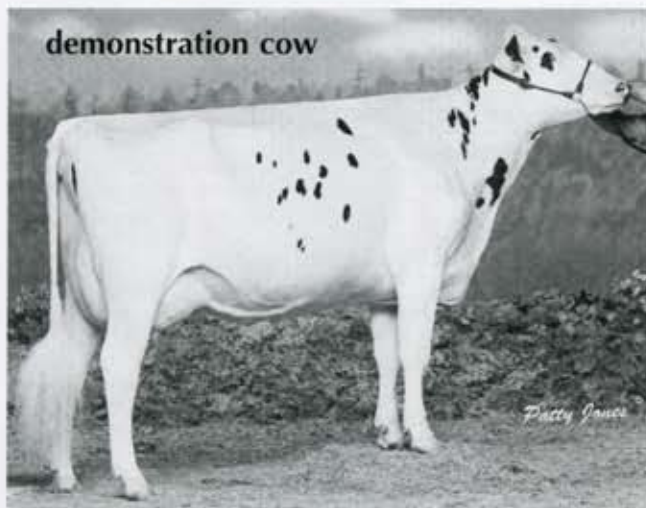
Structural Defects and Discriminations

Structural Defect	Show Ring Discrimination
abdominal rupture	serious
advanced anus	serious
corkscrew claw	serious
freemartin	very serious
Roman nose	slight
recessed or advanced tailhead	slight
spastic (crampy) syndrome	very serious, particularly in younger cows
teat fistula (side leak)	serious
undershot or overshot jaw	serious
webbed teat	serious
wry face	serious
wry tail	moderate, depending on degree of curvature

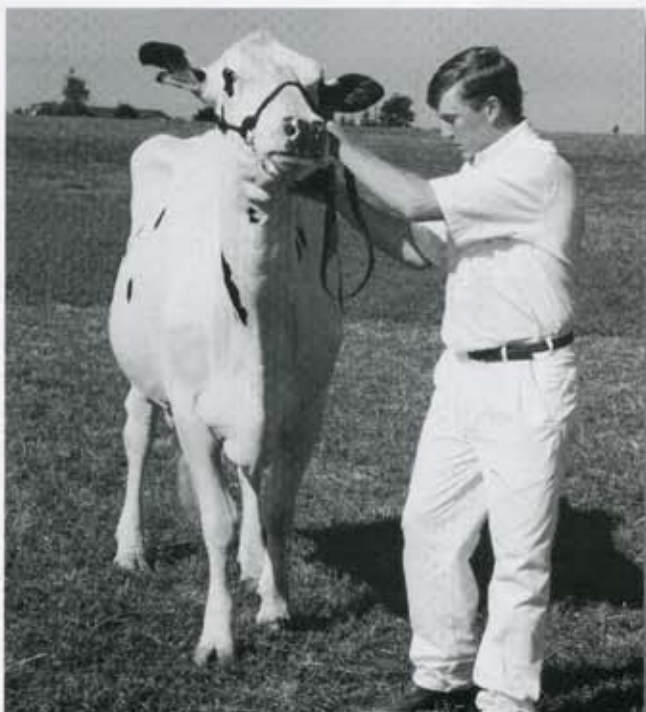
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Comparing Individual Parts of Cows

The individual parts of a demonstration cow are reviewed on the following four pages. Also, a comparison of desirable and undesirable characteristics of other females is included.



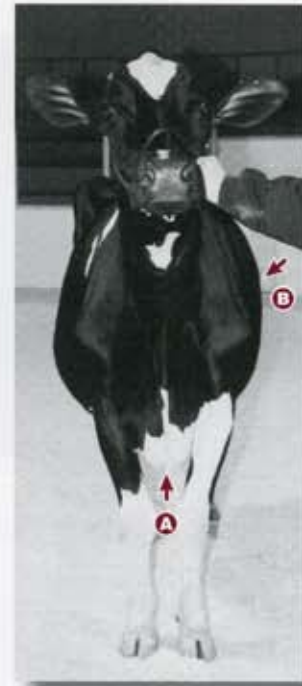
Our demonstration cow below has a wide muzzle, width of chest, freedom of movement in the front legs, and dairy character through the front end.



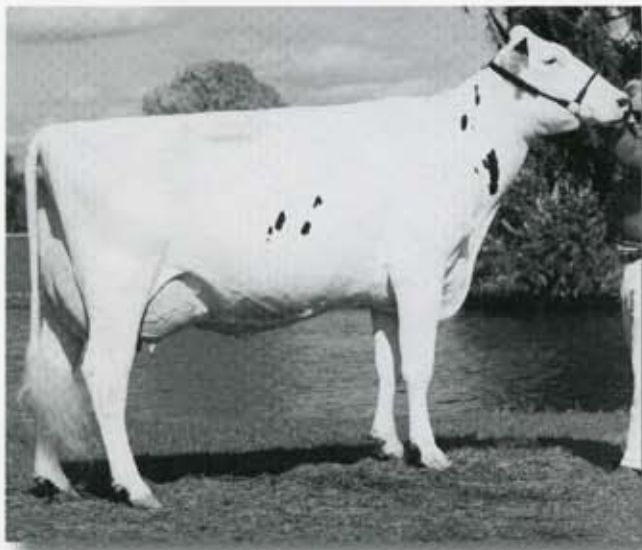
Notice the strength of head on this next clean-cut cow. She has a strong jaw exhibiting plenty of breed character with a long, lean, dairy neck, clean jowl, and throat.



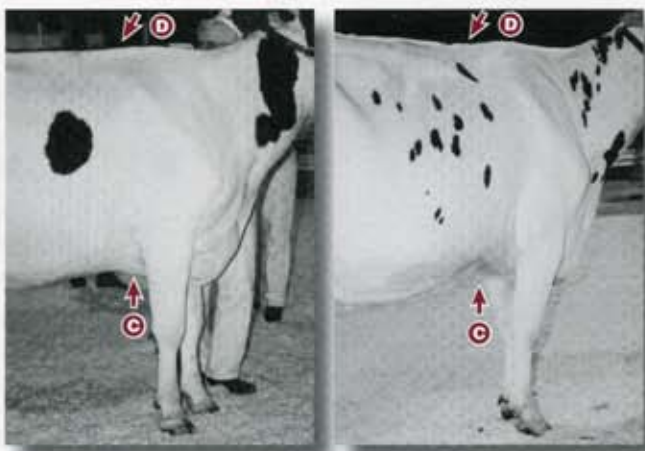
Below, the cow on the left exhibits more width of chest **A**, more spring of rib **B**, and width of muzzle than the cow on the right.



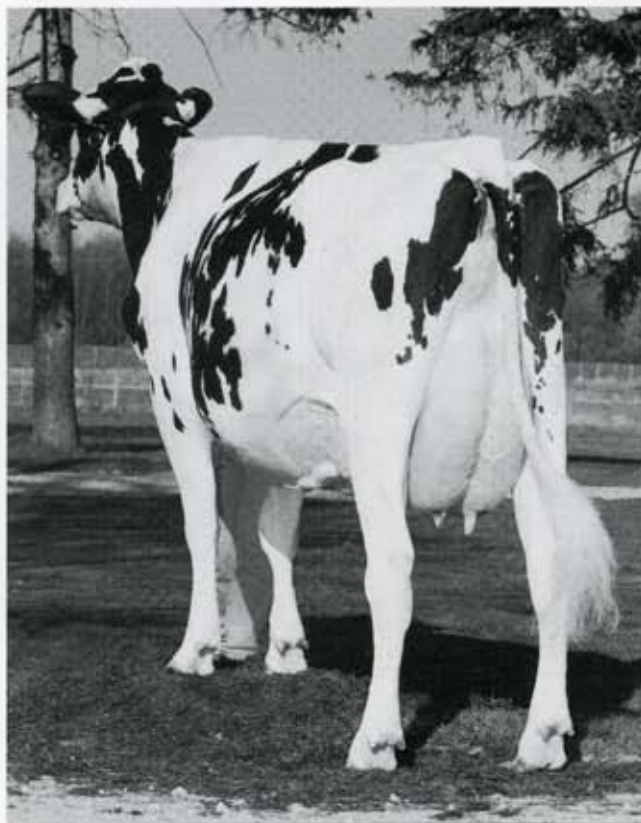
This cow below displays depth and openness of both fore rib and rear rib. Cleanness of head and neck, and length of body are apparent. Observe the overall length and balance of the cow. She displays cleanness and quality of bone, depth of heel, and strength of pasterns.



The cow on the bottom left reveals more depth of heart **C** than the cow on the right. Notice how the cow on the left blends more smoothly from neck into shoulder, shoulder into body, and is fuller in her crops **D**.



This cow displays desired angularity. She possesses clean bone, thin clean thighs, sharpness at the withers, depth and openness of frame with a pleasing combination of dairyness and strength.

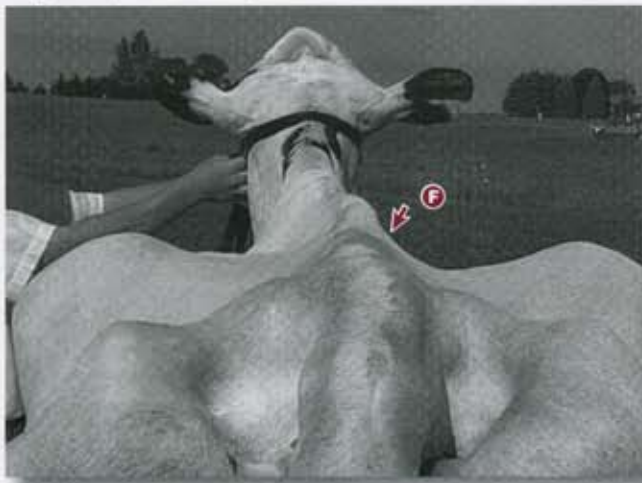


Note the strong topline below, particularly the strength of the loin attached wide on the hips. Also view the overall length of rump and the correct positioning of the thurls **E**.



6

From the rear on the cow below, observe the desirable width of hips, thurls, and pins. Acknowledge the overall width of the hips. Arrow **F** indicates the strong bridging and strength of the loin. From the top, notice the width and strength of the loin, the blending of withers into the body, and the sharpness and angularity at the top of the withers.



The first cow below shows a desirable rump. She has the ideal slope from hips to pins **C** with a clean, well-defined tailhead setting. She also shows more overall cleanness and dairyness throughout the rump. She is cleaner and more

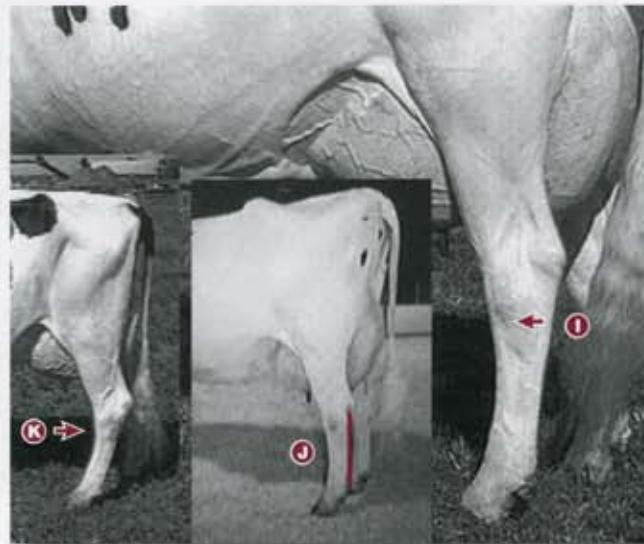


refined about the tailhead than the cow in the bottom photo.

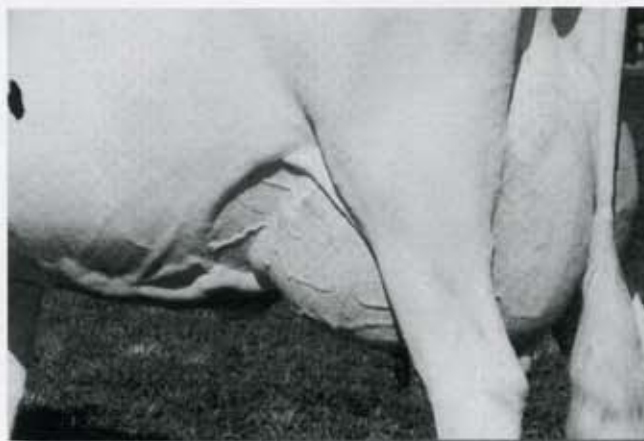


This bottom cow's tailhead is advanced, and the rump angle is too high in the pins **H**.

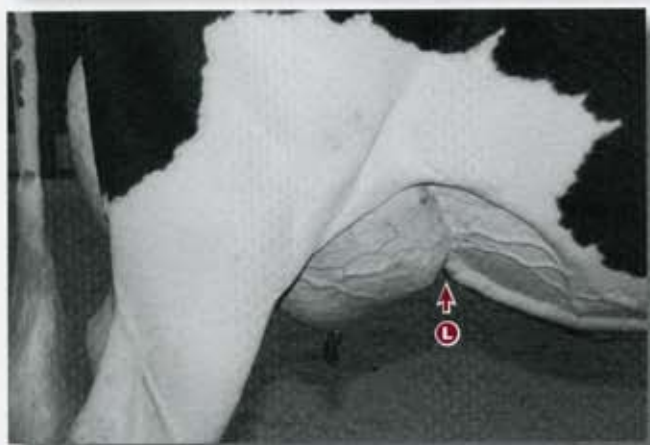
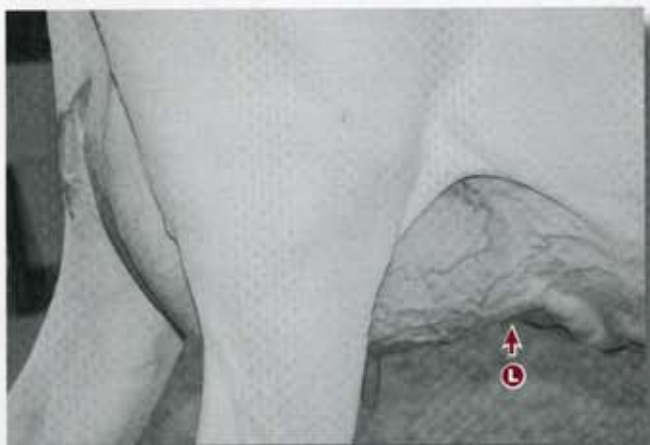
Compare the ideal set of legs on the right. She exhibits flat, clean bone in the hock **I**, desirable set or curvature to the legs, strong pasterns, and deep heel. The legs on the middle inset cow tend to be too straight **J**, and show more coarseness in the hocks. The cow on the far left inset exhibits too much curvature **K** in her hind legs, and has weaker pasterns.



This mammary system displays desirable length, width, capacity, and balance. The floor of the udder is well above the hocks, and the fore udder is very desirable.



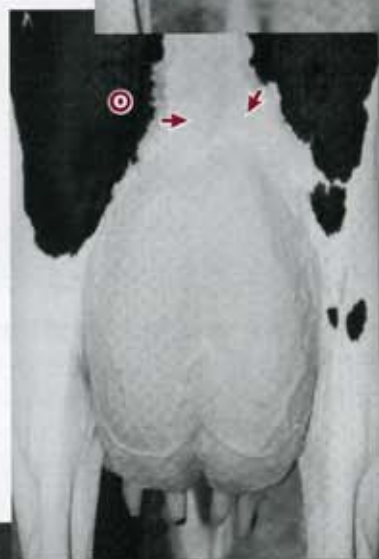
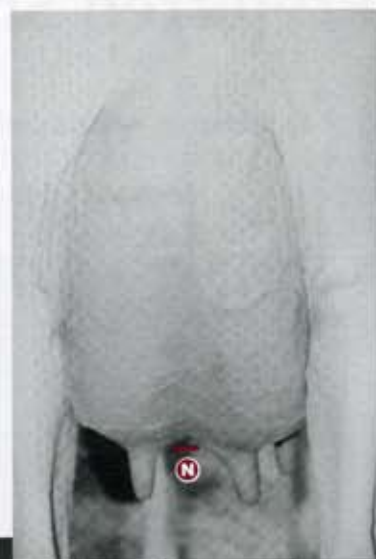
When comparing the two examples below, the top cow has an advantage in overall length and levelness of the udder. The fore udder attachment **L** is more smoothly and firmly attached to the body wall.



In the photo at right, note the height and width of the rear attachment. View the strength and definition of the median suspensory ligament **M** with the quarters clearly defined. The teats, of desirable size and shape, are properly positioned under the quarters.



These photos indicate some undesirable rear udder traits. This top cow lacks definition of the median suspensory ligament **N**. The one in the middle indicates a low, narrow rear udder attachment **O**. The cow on the bottom displays an unbalanced rear udder **P**.



Keep the five areas of the Score Card in mind when judging, but do not assign numerical points.

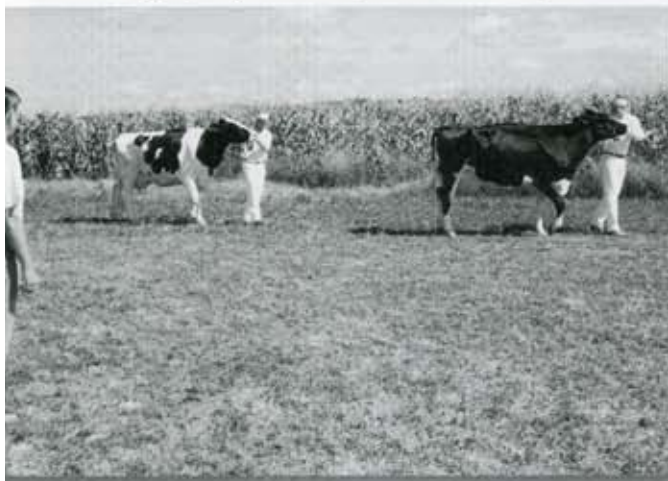
8

Preferred Show Ring Procedures

Have you ever dreamed of being the judge and placing class after class of beautiful cows at a major show? Consider these preferred show ring procedures.



There is a system to judging. View animals from the centre of the ring as they enter—ideally from 15 to 20 feet. It's important to view them from the side. You may also compare three or four animals as they circle the ring. From this vantage, animals can be analyzed for freedom of movement, strength of pastern, head carriage, loin strength, depth of rib, and udder depth.



Start at the front and move around the cow assessing the following traits: breed character of the head, width of chest, length of neck and cleanness of front end, depth of body (both fore and rear rib), strength of topline, strength of loin, curvature of the legs, strength of pasterns, bone quality, levelness of udder, strength of fore attachment, length and width of rump, and height and width of rear attachment.



Move to the other side of the animal and observe the fore udder, balance of udder, and overall length of the cow.

Viewing from the top, check the sharpness of withers, spring of rib, and overall blending of these parts.

Animals should fit the class they're in. While a cow may be a great animal, a two-year-old shouldn't look like an aged cow.

Closely inspecting the rear udder allows you to examine the strength of both the lateral and median suspensory ligaments. Also, pay attention to the shape, size, and placement of teats.



After you've gone through this procedure with each animal in the class, return to the centre of the ring and watch the cows move again.



Pull the cows you want to observe closer into a lineup, starting with the best ones.

When the cows are in a line, observe the entire group, from the rear.



Then walk around to the front of the animals to view their front ends.

When all the cows are in their final lineup, walk down the rear of the lineup for one final inspection. Begin to mentally organize your reasons.

This is also the time to select the best udder of the class, and motion with the sweep of the arm, the completion of the class.

If you've missed a good animal down the line, don't be afraid to bring her up and mention in your reasons that you've missed her. You'll be respected for placing the class correctly.



10

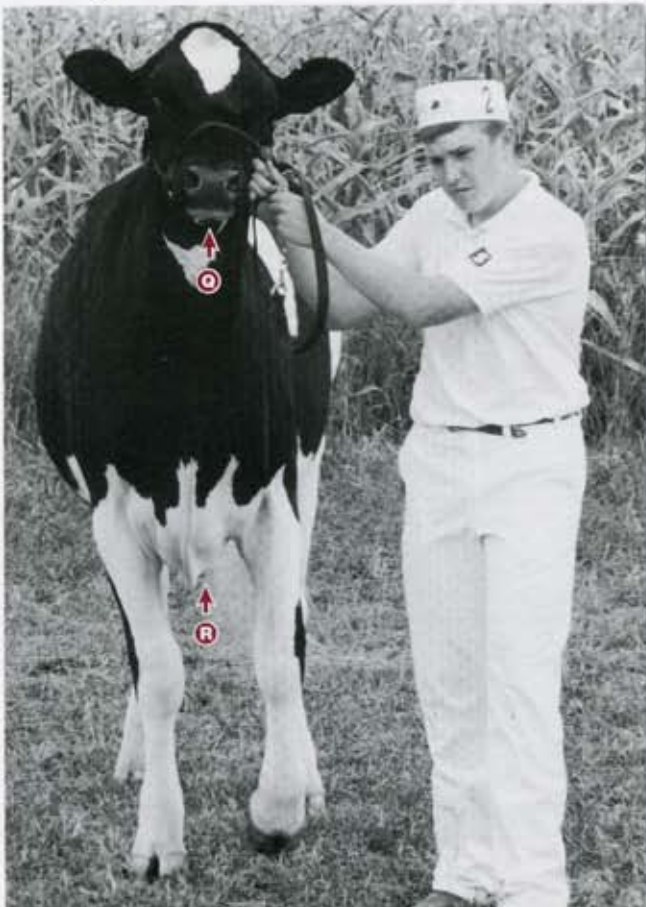
Description of Heifer Parts and Relative Emphasis

The relative emphasis for heifers differs from cows. The major emphasis is placed on feet and legs, and frame and capacity.

Relative emphasis for calves and heifers:



From the front, notice this heifer's width of muzzle , width of chest , and straightness of front legs.



Observing the head, you see breed character, strength of jaw, and dairyness through the head and throat area.

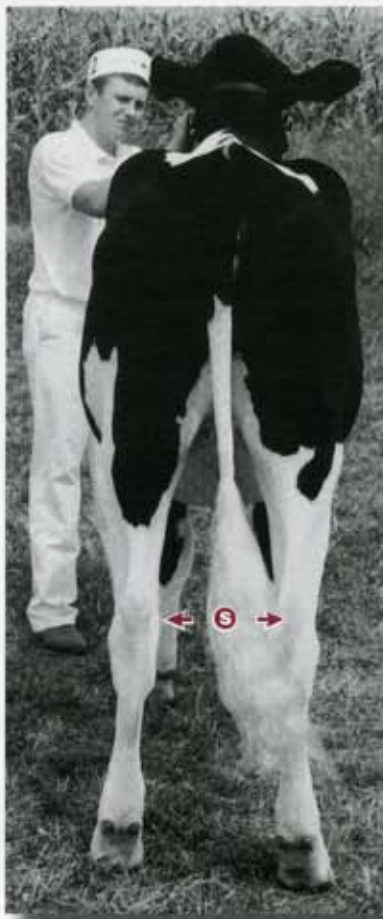


While judges expect yearlings to be dairy and angular with strength, some body conditioning in preparation for calving should be accepted.

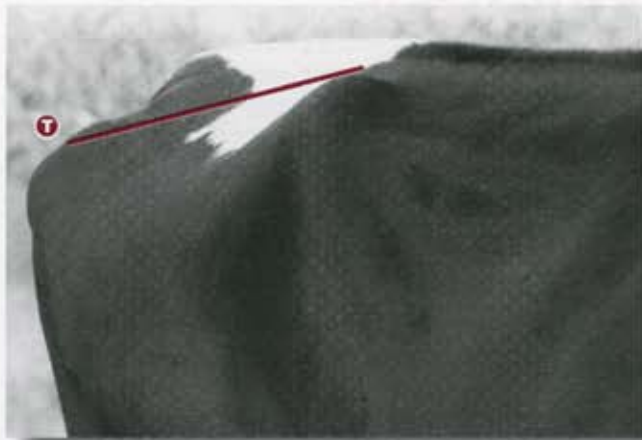
From the side, you will want to check out height of front end, overall length, strength of topline, depth of fore and rear rib, and openness and dairyness of frame.



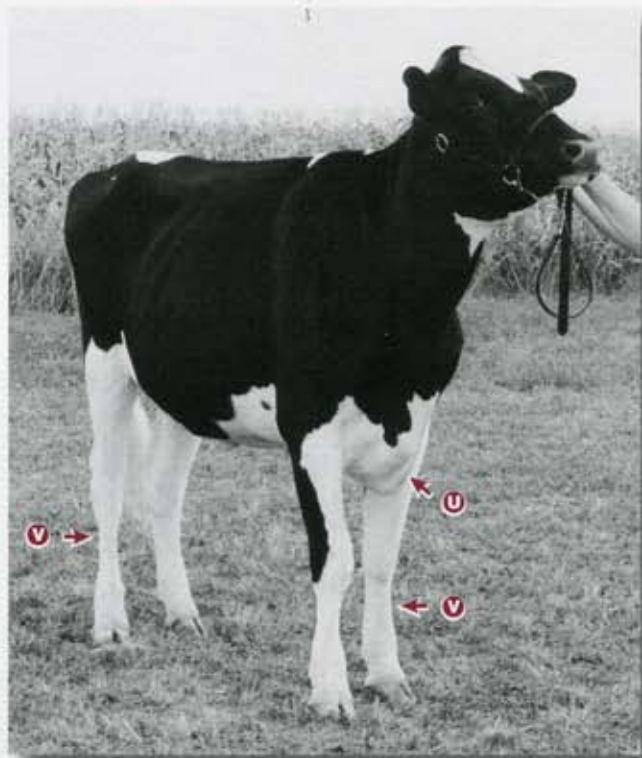
From the rear, note this animal's flat, clean thighs, allowing room for future udder development. Notice the quality of bone in both the front and rear legs, flat and clean hocks, good width between the hocks **S**, strong pasterns—both fore and rear—and good depth of heel. Also notice the width of the hips, width and placement of the thurls, sharpness of withers, and overall blending of parts.



From this side view of the rump, recognize the desired slope from hips to pins **T**.



From this view, observe the breed character about the head and neck, a long, lean neck and cleanness of throat and brisket **U**, flat, clean bone in the legs **V**, overall length and angularity.



From behind, check heifers underneath very quickly for regular size teats.

12

Placing a Heifer Class and Formulating Reasons

In this sample heifer class, the judge uses the same ring procedure as for the cows.

Following is the judge's initial mental analysis of the heifers in this example class.

The first heifer (1) is well-bodied with a hard topline. You'd like to see her taller in the front end.



The second heifer (2) is also well-bodied. However, she has a short neck, and doesn't handle her rear legs well.



The third animal (3) is a large heifer lacking dairy character throughout.



The fourth (4) exhibits excellent overall style, angularity, and openness of rib.

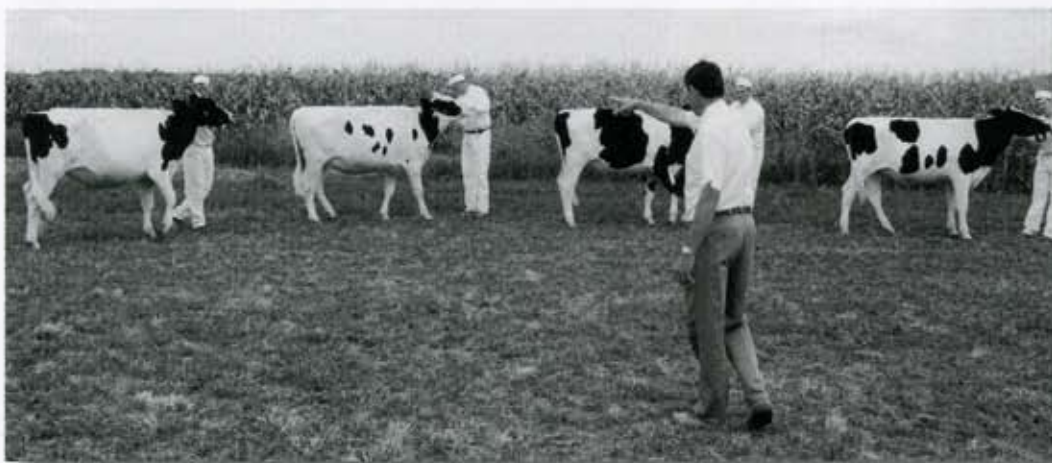


When giving reasons, say first over second, second over third, etc. Don't use the numbers of the animals.

As with the cows, the judge begins analyzing each animal by starting at the front and moving around each one. For each heifer, he observes depth of body, strength of loin, strength of topline, and set of legs. Over the top, he looks at sharpness of withers, strength of loin, spring of rib, and overall blending of body parts. The judge moves back to the right side of the animal and watches her move.

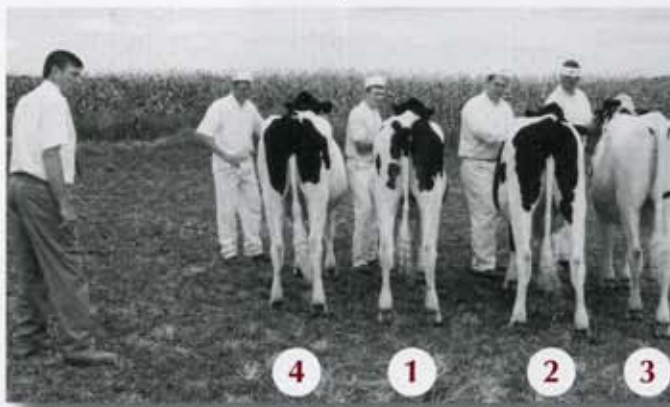


After the judge has made his initial pull, the heifers are brought into line. This gives the judge a chance to view them from the rear.



The judge's final reasons on this class:

This class of yearlings is very placeable. The heifer standing in first place is an easy winner. She has overall style and angularity. I like her openness of frame. The first animal places over the second because she's taller at the point of withers, has more total length from head to tail, and is more open ribbed than the heifer in second. Second over third is a close placing. However, the second heifer handles her rear legs more correctly, and is longer and leaner in her neck than the deep-bodied heifer in third. Third places over fourth as she displays more breed character about the head, is deeper of her body, is more angular, and exhibits more dairy character than the fourth place heifer.



You've just reviewed the basics of judging. Now, select a few animals at home, and after analyzing their strengths and weaknesses, compare one to another. You be the judge!

Giving Good Reasons



Effective reasons describe placings accurately, and compare animals in the class.

Your job is to analyze each animal, place the class, and describe to exhibitors and spectators why you've placed the cattle the way you have.

You don't need to attend a judging school to practise giving good reasons.

While avoiding *canned* reasons, slowly practise the words you might use in placing a class. Practise in front of your family and friends, and often!

Add new phrases as you gain confidence and success.

Reasons must **reflect the class** being judged.

Never give an inaccurate reason or one not describing the class at hand.

1. Once you've finished a class, stand behind the top four to six animals and organize your thoughts.
2. Start your first set of reasons of the day with a cordial statement indicating your pleasure/honour to be invited to judge.
3. Speak slowly, crisply, and confidently into the microphone as the animals parade past. Stand straight, but relaxed.
4. Start each set of reasons with an opening statement. Use only **descriptive** terminology at the beginning or end of a set of reasons to generally describe the class, and/or the first place animal. For examples: this is a superior lineup of aged cows; we have an easy winner on top; the first three cows caught my attention as soon as they entered the ring.
5. Use simple words. Do not use slang, or trendy words that ringside spectators don't understand, e.g. chrome on udder.
6. **Comparative** terminology must be used, comparing one animal to the animal placed below it. The animal should not be described. Comparative terminology uses words ending in "**er**", such as longer, wider, taller, deeper, etc.

Sharper at the point of *withers* (not shoulder) is correct. The often-used term hooks should be referred to as *hips*.

7. The obvious points of difference should be your primary concern. Use one really good point, and another couple of points of difference for each pair of animals.

8. Always start with the most important reasons as to why one animal places over another. Consider only the major points of superiority. Grant an obvious advantage to a lower animal, especially in close-placing pairs.
9. When two animals are extremely close, give only one or two reasons for placing them the way you did.
10. In a not-so-good class, keep the reasons short. Don't try to manufacture something that's not there.
11. Don't give overly good reasons on any one class. Leave your options open for better animals in the following classes. Then you can build up your champions.
12. Always be positive when giving reasons.
13. Allow your brain to work faster than your tongue.
14. Conclude the show with complimentary remarks about the quality of the show, support of exhibitors, etc.

Summary of Giving Good Reasons Following a Class:

- start with a descriptive statement
- emphasize only the main points of difference
- use comparative terminology (not descriptive) to compare one animal to another
- be accurate
- be positive
- grant an obvious advantage to a lower placing animal

Canadian judges receive training, and practise giving reasons to support their placings.

Tips for Your Judging Assignment

- ✓ dress professionally; set an example as a Canadian judge. Men should wear a suit (or sports jacket/pants) and tie. Women should wear a pantsuit, or dress pants and jacket/vest.
- ✓ be well rested
- ✓ obtain the cell phone number of a contact person at the show in case of travel or other problems
- ✓ arrive at the show at least 30 minutes prior to starting time
- ✓ discuss with your ringman where animals are to be lined up, keeping in mind the final lineup should be viewed from behind by the largest audience
- ✓ carry yourself with composure and presence, without arrogance
- ✓ display confidence—a feeling of assurance or certainty
- ✓ recognize the cows as the main attraction; do not grandstand
- ✓ inspect every animal closely in each class
- ✓ establish a pattern. Animals placing high in individual classes should portray the same traits.

16

Visiting in the Barn Following the Show

As a good public relations function, it's important that you visit exhibitors in the barn after the show.

Divide your time fairly among all exhibitors. First-time showpersons standing down the line deserve your attention as well as the top winners. It gives them an opportunity to ask you some questions about what they did well and what they could be

doing differently. You have a wealth of expertise to share.

Try to end your visit with the Premier Breeder, Premier Exhibitor and exhibitors of the Reserve Grand and Grand Champion.

It's perfectly acceptable to socialize and enjoy the after-show atmosphere, but remember your

official position—you're representing the breed.

Always conduct yourself in a professional manner.

Finish your judging experience on a high note.



Canadian judges are ambassadors for the Holstein industry. They represent the Canadian breeding philosophy and efforts of fellow breeders from coast to coast.

The Value of Judging Beyond the Show Ring

Life skills developed through judging include communication, problem-solving, and decision-making.

Judging cattle is one of life's richest experiences. The knowledge and practical skills gained through closely evaluating, reasoning, and making decisions extends far beyond placing animals. It's about developing valuable transferable skills for use in many of life's situations, at any age.

If you plan to breed cattle, make business management decisions, or invest in the dairy industry, you must develop a keen eye for detail. Judging cattle involves looking for particularities, and weighing differences. Without the ability to evaluate cattle and to make logical, quick **decisions**, it would be far more difficult to manage a viable dairy business.

We are not born with the natural ability to reason through difficult situations, work under pressure, or make sound decisions quickly. These skills are developed through experience. Judging in a time-limited setting sharpens decision-making expertise.

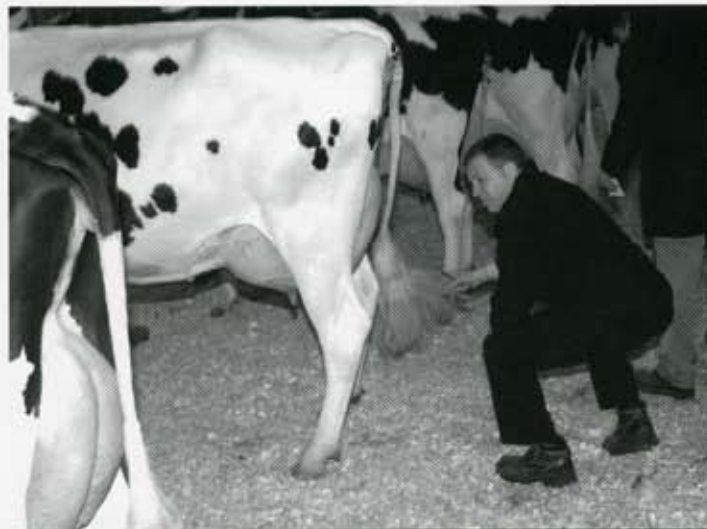
The reasoning process is the same for, "Which cow do I place first?" and "Should my business spend \$50,000 on this equipment now?" Both situations involve **problem solving**—a complex process of weighing facts, utilizing information gained from earlier experiences, and making a decision.

Life is full of times when you must explain your ideas and decisions. By presenting oral reasons in the ring or barn, you learn to organize,

prioritize, and present your thoughts in a clear, concise manner. It's about selling yourself, your ideas, and persuading others—**communication**.

Judging develops confidence and a sense of achievement.

The respect and admiration earned from a job well done brings lifelong satisfaction—whether through a good business plan, or a successful judging experience. And long-lasting friendships and contacts you make through working with people of similar interests remain one of judging's greatest benefits!





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Photography courtesy of Patty Jones,
Canadian Livestock Photography

Updated 2005

FITTING AND SHOWING

Fitting and showing is the main activity for many 4-H dairy clubs. The “Preparing to Lead” and “Leading to Win” booklets printed by Holstein Canada have become the standard documents to learn information about training, fitting and showing your 4-H project (or any other show animal). They are included in this section for your reference in learning these skills.

Fitting and Showing Clinics

Instead of demonstrating fitting and showing at a regular 4-H meeting when time is limited, it may be advantageous to organize a fitting and showing clinic to give members time for hands on practice.

A sample schedule for a clinic is as follows:

When: Saturday, 9:30 a.m. to 3:00 p.m.

Where: A local farm

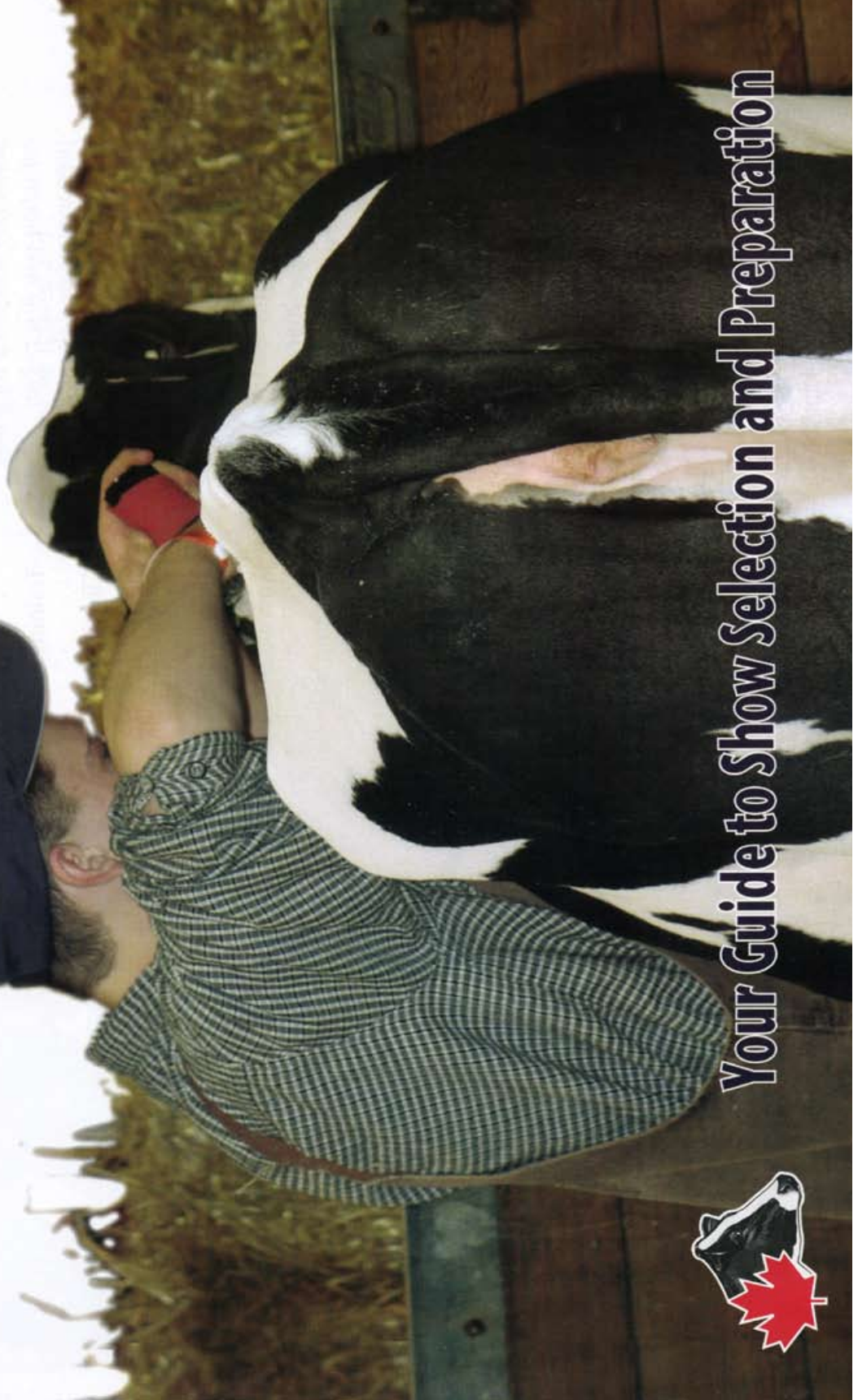
What: A day to practice calf preparation and showing skills

Agenda:

- 9:30 Registration
- 9:45 Welcome, overview of the day and begin washing calves
- 10:30 Hoof trimming demonstration
- 10:45 Clipping demonstration
- 11:00 Start clipping
- 12:30 Lunch
- 1:00 Finish Clipping
- 1:30 Show preparation and ethics discussion
- 2:00 Showmanship demonstration
- 2:30 Practice showing
- 3:00 Safe trip home!

What to bring: White show clothes, lunch, a show halter with your name on it, brushes, cattle clippers.

PREPARING TO LEAD



Your Guide to Show Selection and Preparation



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PREPARING TO LEAD

*Show day seemed a long way off when you first began preparing your calf for the big event. Time and effort, these past months, has produced a contented, but alert animal ready to take on the competition. Feel relaxed and confident as you lead your calf into the ring—after all, you **are** prepared.*

This booklet was completed well prior to national legislation requiring all animals be tagged for national health and movement off-farm. All Canadian animals must now be officially tagged to qualify for Holstein Canada registration, shows, and HACCP programs.

Other show-related manuals are available in English, French, and Spanish. A DVD to complement these manuals may be ordered. International formats: NTSC and PAL.

Selecting Your Calf

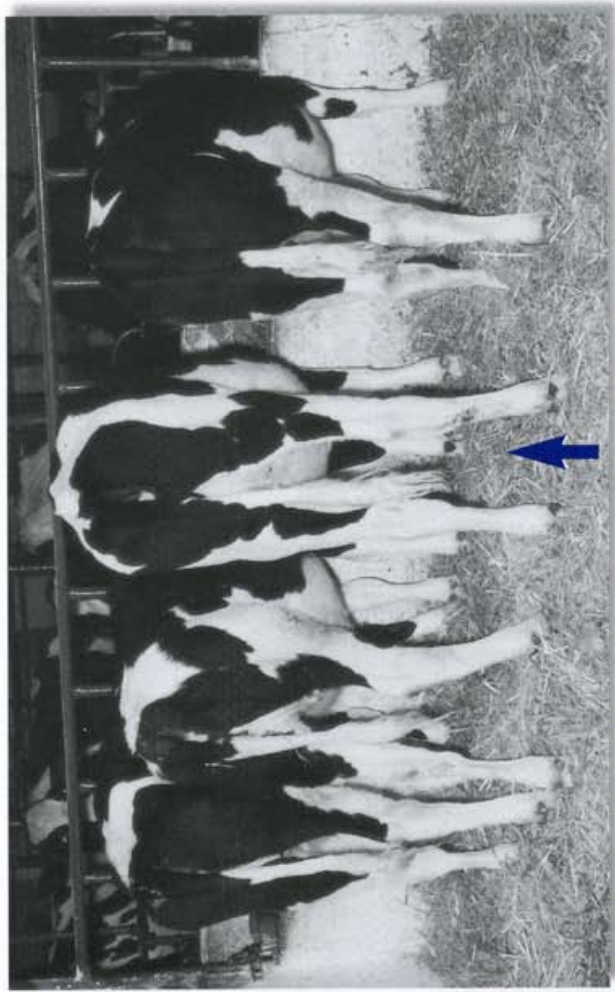
The first thing to do is choose a calf that best suits you. Consider both the age of the animal and your size before making the final selection—remember, the show is six or seven months away.

From this pen of calves, eligible for the same age class, select a calf that

- ✓ is **stylish** with good head carriage and balance of parts
- ✓ exhibits **dairy character**, a **long neck**, and flat bone
- ✓ walks freely on **good legs** with

- correct set, good depth of heel, and strength of pastern
- ✓ has a strong, well-blended shoulder
- ✓ is **well grown** for its age
- ✓ has deep, open rib
- ✓ has a long, wide rump with correct slope from hooks to pins
- ✓ shows a strong, level topline
- ✓ is slightly taller at the front end, and walks uphill

Avoid over-conditioned or short heifers that lack style.

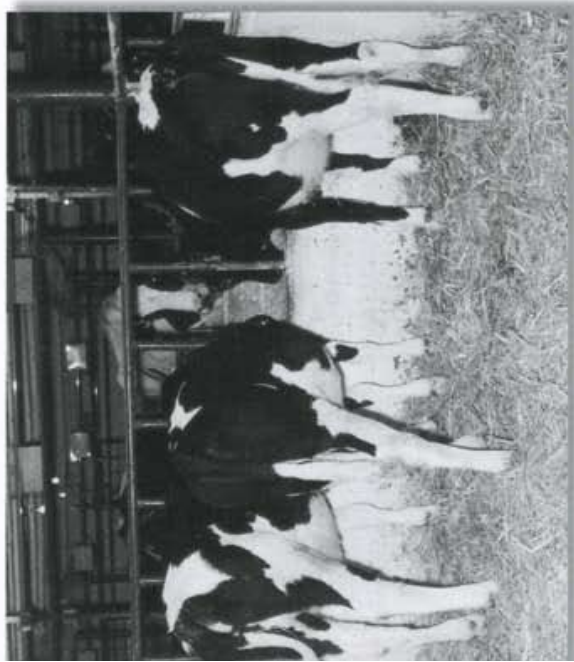


The best show-type individual is selected from this group of calves eligible for the same age class.



This calf displays a well-blended shoulder, wide rump and good head carriage.

Caring for Your Calf



Calves are grouped according to size in a clean, dry bedding pen.

Group your heifers according to size and condition. You may have to change your heifer's grouping as it grows. Keeping it competitive and hungry for food helps it to keep growing.

Your calf should have fresh air and freedom to move. Regular exercise is very important.

Keep the calf's pen clean and avoid wet, soft bedding packs.

2 Practise good husbandry. Always provide

fresh water and feed from a clean manger or eating area.

Feed to maintain growth, but constantly monitor the calf's weight so it doesn't become over-conditioned, too fat, or too thin.

The conditioning of a calf can be controlled by monitoring its grain/energy intake (e.g. corn, barley, protein supplement). However, avoid sudden changes to the diet and feeding times.

For a *shallow bodied* heifer, provide lots of good quality grass hay.

Early-cut grass hay is superior to alfalfa. Avoid excessive amounts of lush pasture, green feed, and silage as these pass through the system too quickly.

Feed limited amounts of beet pulp at home to accustom your calf to the taste.

For an extremely *deep-bellied* heifer, *regulate* the water intake to twice a day. While a calf requires enough water to maintain itself, it shouldn't have free access to a water bowl.



This calf is fed grass hay from a clean manger.

Training Your Calf

Every calf should be trained to lead at a very early age.

After selecting your calf, dedicate some time each week to training. Practice makes perfect.

Use a soft rope halter, when starting, until the animal follows freely without tugging.

Always treat the animal kindly and



This calf is tied with a soft rope halter at a comfortable level. The slip knot can be easily undone, and is at a different place than the pressure point where it's tied. The calf cannot jump over the partition.

gently, and reward good behaviour by petting or stroking.

Begin training by tying the calf's head at normal head carriage for approximately 20 minutes daily. Use a soft rope halter with about 6-8 inches of rope that won't tighten under the jaw. Use a slip knot that can be easily undone, and tie the knot at a different place than the pressure point where it's tied.

Secure the calf to something solid that it can't jump over, and stand it on a soft pack to avoid injury. Stay close to the calf for the first few times it's tied to prevent accidents.

Once the animal can be controlled on the walk, introduce a leather halter and chain lead strap.

Aim to train the calf daily as show day approaches.

Teach it to walk at a show ring pace with desirable head carriage.

Accustom your animal to sudden noises and distractions.

Have someone approach and touch the calf in the same manner as a judge. By feeling the hide and walking around the

calf, it shouldn't shy as easily.

Train the animal to respond quickly to halter commands, fitting any show ring situation. You don't want to be fussing with it on show day.

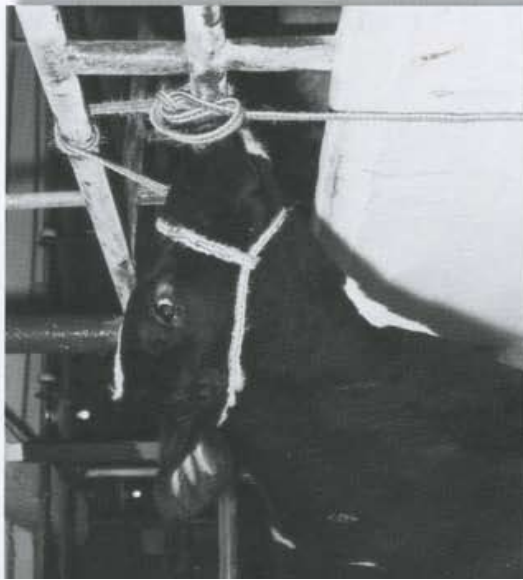


Displaying good head carriage, this calf has been trained to lead at a show ring pace. It is accustomed to noises and doesn't shy when approached.

Clipping at Home

Clipping is an art and begins well before show day.

Tie your calf at a natural, comfortable level—basically the same height it will show at.



The calf is tied at a comfortable level for clipping.

Six weeks before show day, begin preparing your calf to be show-ready.

By brushing hair forward on the topline, it will become trained to stand up.

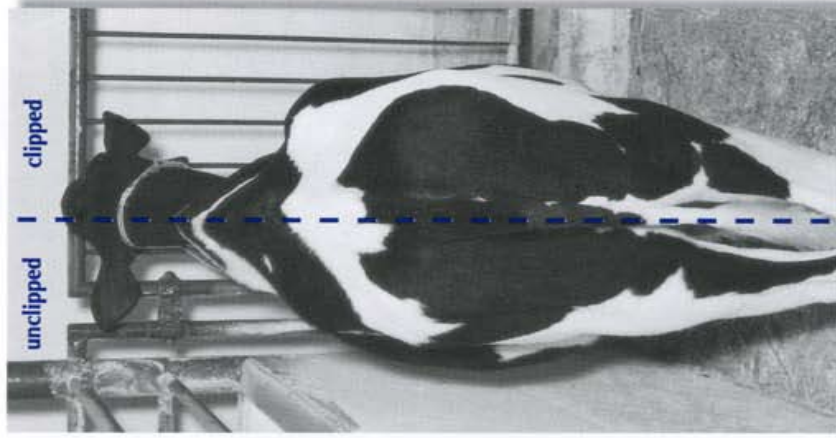


This fitter clips the same way with the hair.

On your clean calf, clip the head, neck, brisket, front and rear legs. You could also use special plucking blades to clip the body.



Note the special plucking blades on the right, compared to the regular clipping blades on the left.



Compare the clipped right side to the unclipped left side.

Caring for Feet

Hoof and foot care are often overlooked. Proper maintenance and trimming has a lasting influence on the animal's mobility and longevity.

Trimming should be done six weeks before the show.

A professional hoof trimmer provides a good service in preventative medicine.

His tools include:

- 2-inch chisel with T-bar
- hoof knife
- 1-inch chisel
- a rubber mallet or hammer



Tools used for trimming feet include (bottom to top) a 2-inch chisel with T-bar; hoof knife; 1-inch chisel and hammer.

Taking small chunks at a time, the front hoof is rounded off with a chisel. A little is also taken off the inside of the toes.

The trimmer levels the underside of the hoof.



The front hoof is rounded off by carefully removing small chunks at a time.

Trimming makes a big difference. On the untrimmed right foot, the calf toes stick out. On the trimmed left foot, the weight is more evenly distributed, allowing the calf to stand more correctly.



Transporting Your Calf

Arrange for transportation well in advance.

A gooseneck trailer is an ideal way to transport an animal.

Spread some sand on the floor for traction and shavings to keep the floor and animal clean.

It's always a good idea to have another person around to help with the loading and unloading.



Sand was spread on the floor before two people assist in loading this calf onto a gooseneck trailer.

If tied, provide about 12 inches of slack for each animal, and have the head at a comfortable level. If loose, divide according to size in pens.

Check the animal periodically while in transit. Long hauls require stops to feed and water.

Always check and double-check that the door is locked securely.

If crossing borders, ensure that registration and health papers accompany the animal.

Give the animal a bit of slack when it's coming off the trailer—it likes to see where it's headed.



This calf is tied at a comfortable level in the trailer.



Coming off the trailer, the animal is given a little slack as it likes to see where it's going.

Arriving at the Show

If convenient, have the bedding ready before your cattle arrive at the show.



This well-prepared bed is packed down with a fork and edged with a strawboard.

To make a bedding pack about seven to eight feet in length:

1. Level the ground with a shovel.
2. Shake and pack about 12 inches of straw, leaving no chunks.
3. Distribute and pack shavings so they'll filter through and allow some absorbency; this also binds the straw together.
4. Put down a second layer of straw, and pack it down.
5. Work in another layer of shavings.
6. Edge with a fork and push in any loose straw.

7. Level the edges with a strawboard, and use a fork to pack down the edges.

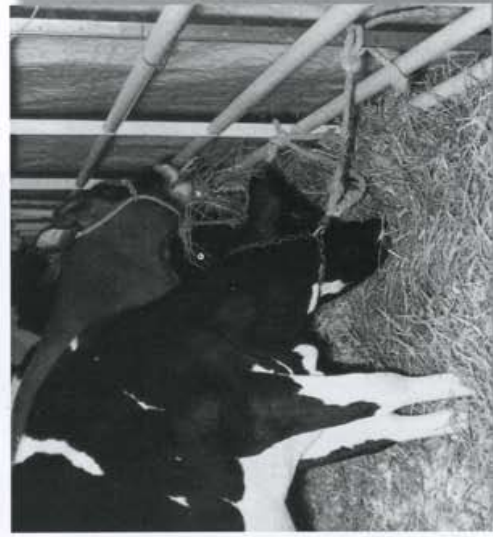
Make your animal comfortable, and accustom it to show surroundings as quickly as possible.

Tie calves approximately three feet apart.

A rope halter or neck chain with a two-way tie works best for tying your calf at the show. Give the rope about 18-24 inches of play.



This Jersey calf is fed hay at the show.



The Holstein is tied by a neck chain with a two-way tie. The Jersey has a rope halter.

When you arrive at the show ...

- Give the calf hay.
- Follow with water every 8 to 12 hours. It may need time to adjust to the taste difference. Use a pail or bucket and hose for watering to prevent the spread of disease.
- Feed and water at normal, regular intervals.
- Allow time for rest.

Washing Your Calf

Always wash your animal on a surface with good footing. If needed, spread some sand on the ground or floor to prevent slipping.

Wash your calf several times at home, and treat it for lice, mange, scale, and scab. Regular washings condition the calf to be relaxed when sprayed with water at the show.

Tie the calf fairly tightly at a comfortable level so it doesn't *dance around*.

Use a nylon wash halter, but not the same one as used to tie the animal in the row.

Your washing supplies include:

- a pail
- soft animal soap, like *Orvus*
- liquid laundry detergent, e.g. *Wisk*, or dish detergent like *Sunlight*
- stiff bristled brush
- medium bristled brush
- soft bristled brush
- wire brush for hooves
- flexible hose with a nozzle

Washing supplies include (l to r) a flexible hose with nozzle; wire brush for hooves; soft bristled brush; medium bristled brush; liquid laundry detergent; soft animal soap and a pail.



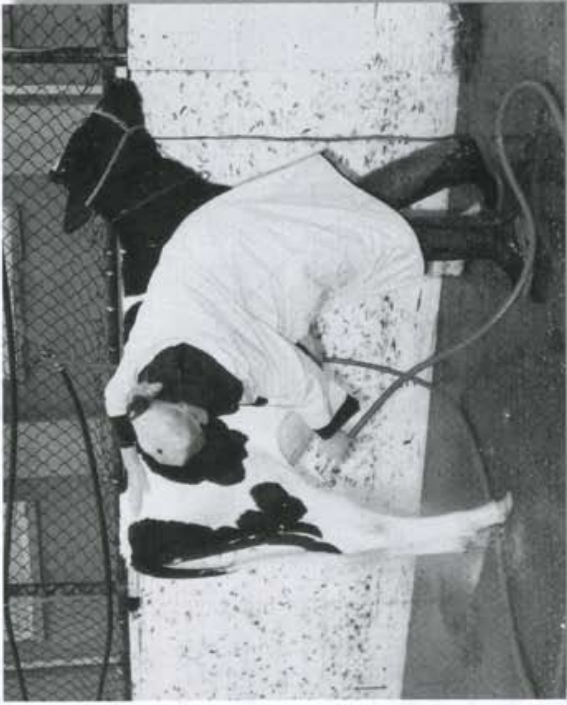
On good footing, this calf is soaked all over. The ears are protected to prevent water from entering which could cause them to hang limp.

Washing your animal is hard work, but very important.

1. Soak the calf all over. It's important to cover each ear with your hand. This prevents water from entering the ears which could cause them to hang limp.
2. When getting underneath and wetting the belly, keep one hand on the calf. Not only does this steady it, but it knows where you are.
3. Apply soap or shampoo directly onto the calf. Brush it in, or work from a pail of soapy water.
4. Use a stiff wash brush to scrub the animal thoroughly including the brisket, front legs, and all the way under the belly.
5. Use a wire brush to clean the feet, staying below the hoof hairline.



Orvus is applied to the calf before it's soaked all over. One person works from a pail of soapy water.



Tied at a comfortable level, all soap is rinsed from the calf's body. Note that one hand steadies the calf.

6. Because soap left in the hair causes flaking and dullness, rinse the entire animal thoroughly.
7. Remove excess water from the hair with a soft brush.
8. Use a soft cloth to clean all dirt and wax from the inside of ears.
9. Blanket the animal long enough to warm it up if the area is cold, damp or drafty.
10. Spot wash if the animal gets dirty.



A soft cloth is used to clean all dirt and wax from the inside of the ear. A nylon wash halter, different from the one used in the row, is used when washing the calf.

Clipping at the Show

Just a day or two before the show, begin the final clip job on your clean, dry calf.

Tie your calf at a natural, comfortable level—basically the same height it will show at.



The calf's head is tied at a comfortable level for clipping.

Before beginning, stand back and take a good look, analyzing any faults that can be corrected through clipping.

Equipment used by an advanced clipper include:

- soft, long-bristled brush
- small topline brush
- small rechargeable clippers
- powerful hair dryer
- three-in-one clipper oil
- large animal clippers

Clippers with sharp, normal Stewart blades, are used for the head and neck, tail, feet and legs, and for blending.

Clippers with special Aesculap plucking blades, leave the hair longer, and are used on the remainder of the body.

Start at the back of the calf. Clip the tail from approximately two hand lengths above the tailbone. Clip all around to the base of the tailhead.

Equipment used by an advanced clipper includes (l to r) soft, long-bristled brush; small topline brush; rechargeable clippers; powerful hair blower; large animal clippers with Aesculap plucking blades; three-in-one clipper oil; large animal clippers with normal Stewart blades.



The tail is clipped from approximately two hand lengths above the tailbone.

Leave the hairs on the end of the tailhead as this adds to the calf's length and angularity.



The tail is clipped all around to the base of the tailhead.

When clipping rear legs, for safety's sake, keep one hand on the calf to steady it.



On the rear leg, all hair is clipped off up to the vein, and removed on the inside of each leg.

it goes from long to short hair.

On front legs, clip all the hair inside and outside from the hoof to the elbow. This exposes any veins, and adds to the animal's dairyness and refinement.



All hair is clipped, on the outside and inside, from the hoof to elbow.



This filter gently clips the hind leg, and keeps one hand on the calf to steady it.

Clipping against the hair, take all the hair off up to the vein in the leg. Make sure all hair from the hocks down, is taken off—including around the dew claws.

All hair on the inside of the legs is also trimmed.

If a calf has extra set to its rear legs, and you want them to appear straighter, leave and blend hair on the front of the legs.

Blend the hair on the lower thigh where

All hair between the front legs to the brisket is clipped.

Clip from the point of front leg up to the point of shoulder.

It's a good idea to have someone assist by holding the head. To project dairy quality and refinement, all hair on the neck and head is clipped, including the ears and muzzle.

EZE-IR tags must not be removed.

Clip from the point of shoulder to the top of the shoulder blade.

To avoid making a definite line, a good clipping tip is to place one finger under the right corner of the blades to maintain the correct angle.

Continue clipping up to the shoulder, but don't round it off.



An imaginary line from the point of shoulder to the top of the shoulder blade provides a reference point for the clipper.

By leaving a little bit of hair on the top of the neck, the neck blends naturally into the shoulder.



A little hair is left on the top of the neck to naturally blend the shoulder into the neck.

Blend the hair on the shoulder into the front legs by running the clippers downwards with the hair.

In the rib section, also blend the hair by running the clippers downwards with the hair. If available, use plucking blades to clip against the hair with an upwards motion. Cut straight lines without leaving streaks.

Most calves need a little bit of hair left in the heart and chest areas. If a calf is a



The clippers are run downwards on the rib section. A little weak in the heart region, the hair is brushed back and only the ends are taken off.



The hairs are brushed back and only the ends are taken off on this calf displaying a little weakness in the heart region.

Clip the body all over. Working backwards, clip over the thurls and pins to give a wider, cleaner look.

Now that the rest of the calf has been clipped, move to the topline.

Use a brush and blower, to pull the hair up from the body.



A brush and blower are used to stand the hair on the topline. Notice the proper blower angle.

Now is the time to slowly pare down the hair on the topline to make the calf look angular.



To make this calf look angular, the fitter pares down the hair on the topline. He uses his free hand as a guide.

Using the clippers, start in the middle of the loin and clip backwards to form a wedge.

With one finger under the clipper blades to level them, and to keep them on the proper angle (parallel to the bone), clip the standing hair.

To clip the top of the shoulder, hold the clippers at an angle and trim the standing hair. This gives the shoulder a wedgy, sharp appearance.



To give the calf an angular appearance, hair is blended from the top of the shoulder into the neck.

With the sides trimmed, level the topline.

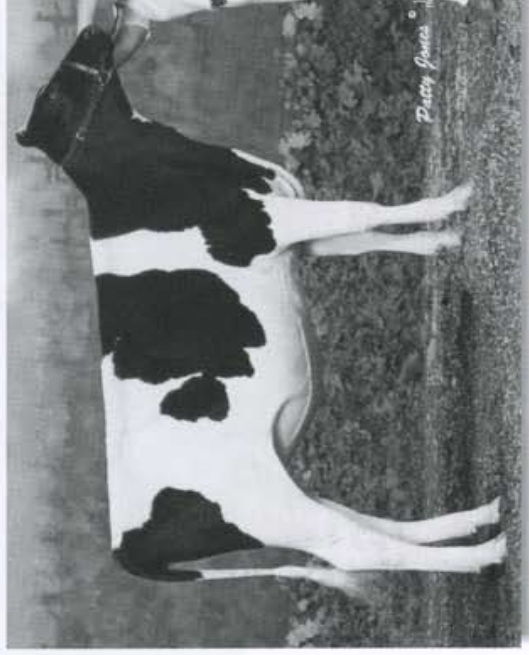
Take any extra hair off by holding the clippers *lightly* in your fingers. Use your free hand as a guide, and to balance the clippers.

Every calf is different, but by taking the hair close to the bone in high spots, and leaving hair in low spots, the topline can be made to look completely level.

Using both hands on the clippers, with one finger beneath the blades, blend the topline into the body. If you're using plucking blades, an upwards motion can be used.



Using the clippers, the body is blended into the topline.

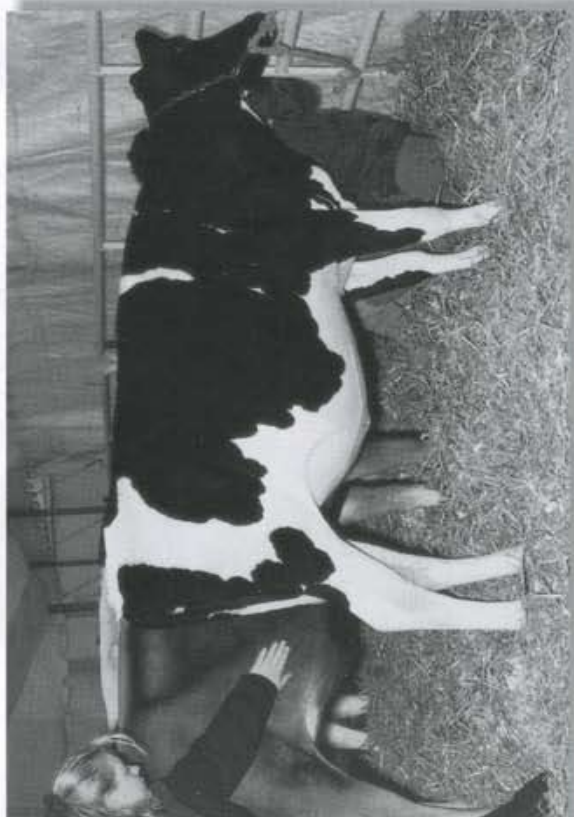


Good clipping takes hours and hours of practise. To achieve this picture-perfect product, all parts must blend into each other. No noticeable marks are left on the calf after clipping.

Filling Your Calf

The filling process is often overlooked and comes from practising at shows.

Study your animal and decide how much fill it needs on show day.



This Holstein is extremely deep ribbed and requires a late fill. The Jersey is more shallow and needs an early fill.

Three different kinds of hay are used to fill your calf. These include:

1. 1st-cut coarse hay
2. 1st-cut finer, grassy hay
3. 2nd-cut legume type hay



This Jersey gets an early fill of beet pulp.

needing a late fill, coarse 1st-cut hay in small amounts, and about half a pail of water. Approximately one hour ahead of showing, give it a little beet pulp. About 15 minutes prior to entering the ring, offer the calf a pail of water.

Add small amounts of grain when the calf tires of beet pulp. A word of caution—too much grain could make the calf sick.

Give the Jersey, needing an early fill, some 1st-cut hay and a pail of water early in the morning. Two hours before the show, give it more 1st-cut hay. Follow with 2nd-cut hay, in small amounts, and beet pulp. An hour before the show, finish with at least one pail of water.

Early in the morning, give the Holstein

Organizing Your Show Equipment

If well cared for, show equipment will carry you through many show seasons.

A show box, appropriate in size to the number of animals shown, is convenient to store equipment at the show. It also helps to keep your area of the barn neat and tidy.

Adopt a colour, and paint all equipment with a lead-free paint.

Clean, repair and take inventory of your equipment after each use. Replace needed supplies such as soap, spray, etc. to be ready for the next show.

At the end of the year, all equipment should be cleaned, painted, and stored.

Clean your show halters after every show. By using saddle soap or leather preservative, you'll keep your halters in top condition for many, many years.

Take good care of your clippers.

- Clean hair and dust from blades, air screens, and oil fixtures with a brush or air hose after each use.
- Keep blades sharp.
- Lubricate blades when necessary to reduce stress on the clipper motor, blades, and to prevent overheating.
- Store clippers in a separate container to avoid breaking blades or damaging cords.



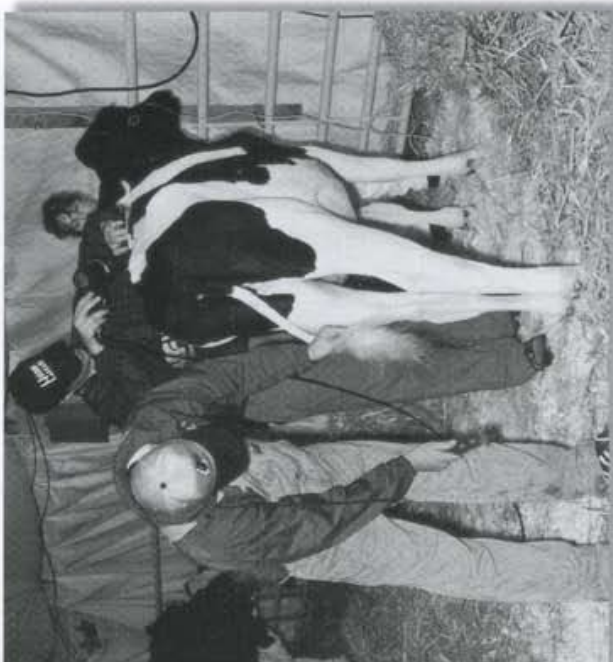
This showperson's exhibit is neat and well organized.

✓ Show Equipment Checklist

- strawboard
- broom
- shovel
- 5-tine fork
- 3-tine fork
- rake
- hose for washing, 4-6 metres, with nozzle
- nylon halter or chain for washing
- soft animal soap or liquid detergent
- basic tool set (hammer, wrench, vice-grips, screwdriver, nails)
- signs and cable to hang signs
- fan
- thermometer
- fly spray
- clippers, blades, oil
- scissors
- hairspray, *Clear* and *Black Magic*
- dressing oil
- powder
- powerful hair blower with narrow nozzle
- water pails
- feed buckets
- wash pails
- wash brushes
- grooming brushes and hair brush
- neck chains and two-way ties
- show halters
- extra rope halters
- extension cords
- registration and health papers

Last-Minute Preparation

Teamwork is especially important when readying your calf for the ring.



Teamwork is important during the last few minutes before entering the ring. The switch is fluffed and the hair is stood on the topline.

Blow the hair up on the topline. If a blower isn't available, brush in spray deodorant to stand the hair, and to add body.

A hairspray-type product, like *Clear* or *Black Magic*, can be used to set the hair. But, it must be blown in so the set looks natural. (Note that this product should be used with caution, as recommended.)



Stray hairs are trimmed to level the topline.

Trim stray hairs with small rechargeable Oster trimmers, or offset scissors.

A soft, long-bristled brush is used to rid the body of loose hair.

Put powder on the hocks to whiten and cover stains. Also, do the front knees.

Put a small amount of baby oil on a cloth, and rub very lightly over the black spots.

Wipe the nose, check that the leather halter fits properly, and fluff out the switch.

Spray lightly with fly spray, if needed.



Last-minute preparation supplies include (l to r) a leather show halter; soft, long-bristled brush; baby powder; *Black and Clear Magic*; fly spray; baby oil and cloth; (front) offset scissors; Oster trimmers; small topline brush and hair blower.

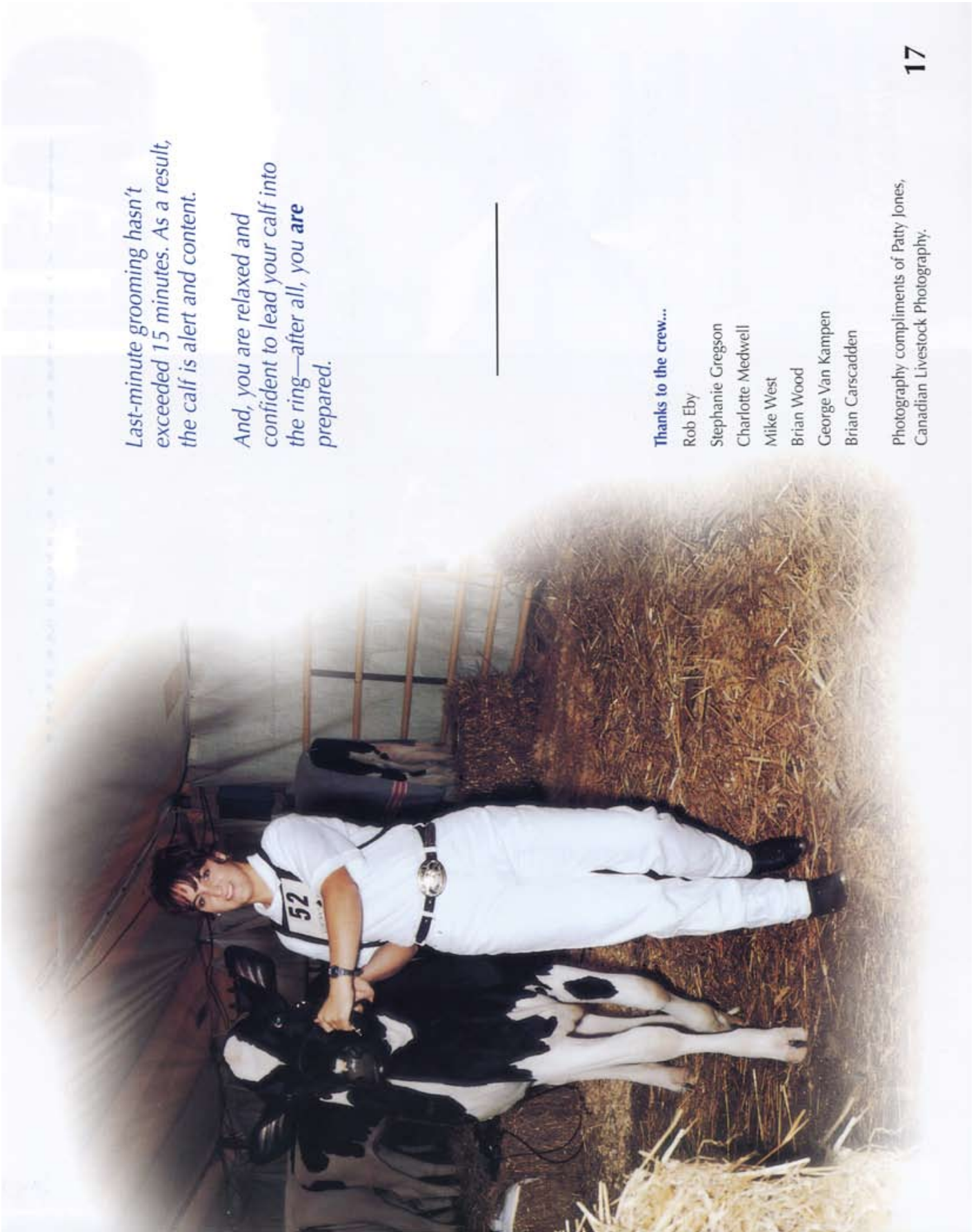
Last-minute grooming hasn't exceeded 15 minutes. As a result, the calf is alert and content.

*And, you are relaxed and confident to lead your calf into the ring—after all, you **are** prepared.*

Thanks to the crew...

Rob Eby
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SHOWMANSHIP...

The Dairy Show Ring Steward

PREPARING TO LEAD

You be the JUDGE

Your Guide to Judging Dairy Cattle

Your Guide to Show Selection and Preparation

Helpful show and judging publications



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SELECTING DAIRY SHOW ANIMALS

Whether you are selecting a 4-H project animal or an entire show string for your herd, there are several things to consider.

- **Conformation** – Analyzing the conformation of potential show animals is an important part of showing. It is hard to be successful if you don't pick the most correct animals to show! Refer to the judging scorecard to help you assess your potential show animals and make the selection to the best of your ability. Remember that conformation is not everything – once you have selected your animal, it is up to you to feed and care for it properly so that it is in the best possible condition to show. If you have several calves to choose from that are your size, narrow your choices by asking your parents to choose the one with the best confirmation.
- **Size** – Select an animal that is adequate for your size and is also well grown for its age. In showmanship, you will have a more awkward appearance showing an animal that is too small for you; but, you might have trouble controlling an animal that is too large for you to handle. It is important that you select a calf that is an appropriate size for you, this way you and your animal are better able to work together.
- **Registered or Grade** – While it is not necessary for 4-H project animals to be registered at the local level, many shows require animals to be registered at a specific percentage of purity. Purebred animals also have higher values for sale or breeding. For some of you this may also be a deciding point, whether you select a purebred or a grade animal.
- **Temperament** – You can't expect an untrained animal to lead perfectly after practicing once or twice, but animals with a gentler disposition will be easier to work with than animals that are less docile. Handling animals from a young age will help ensure that they are quiet and easier to work with as they get older. Be sure to choose a calf that is calm, and not flighty.

Note: Junior members, be sure to get your parents or an older sibling to help you with this. You should start working with your calf as soon as possible and as often as possible.

After you have selected your calf, you will need to set aside some time each day or week to dedicate to training your calf. With each year and new project calf, your training experience will be different. It is important to remember this and start slowly when training your calf; it will take time and patience.

The best way to start training your calf is to tie her up for 20-30 minutes everyday, using a rope halter. Be sure that you have put the halter on correctly, and tie your calf in a comfortable position with its head slightly up. Use a slip knot that can be easily undone, and be sure to tie your animal in a safe spot where it can not untie itself. Do not leave your calf unattended while it is tied up.

After you have tied your calf up several times and it has adjusted the rope halter, you can slowly start working with it. Try quietly approaching your calf from the side and gently laying a hand on it so that she knows you are coming; this is also a good time to brush your calf, as this is calming for your calf, and will give you an opportunity to start grooming her.

Once you and your calf have adjusted to each other, you are ready to take her out for a walk and practice leading! Remember to ask an adult to help you out the first several times, until you know what to expect.

SHOW PREPARATION SCHEDULE

Preparing animals to show requires a lot of work, and is not something that can be done in two days before the big event.

Here is a detailed list of tasks that you are going to cover and complete, prior to the show day:

Leading your calf

- Take your calf out for short leading practices; it is best not to lead her in an open area, where she can get away.
- If the calf balks, pull her to one side or step beside it and gently urge her to go forward, if you have someone helping you may ask them to nudge your calf also.
- If the calf turns to run, pull her in a circle and try again.
- If your calf attempts to break loose, let her go if there is a chance that either you or your calf could be injured.
- It is important to remember that this is all new for your calf, so be patient and you two will be on your way to showmanship success.

Training for the Show

- Start your calf at a slow walk, with continual short, slow steps.
- You will walk backwards slowly, while holding the calf's halter in your left hand.
- Teach the calf to walk beside you with her head slightly lifted.
- Pause frequently to stand your calf squarely and teach it to set its feet in the correct position – use slight pressure on the shoulder, or a slight tug on the halter to switch the position of the feet.
- It is best to ask a family member or fellow 4-H member to watch you practice as their presence will get the calf used to people approaching and touching her, as a judge would in the show ring. Also they can be very helpful in pointing out some tips of how to better set up your calf to make her look her best, like pinching down the loin.

Setting your Calf

When showing your calf, you need to know how she should stand. If you are unsure if you are doing it correctly, ask for help.

Your calf should stand:

- Head raised.
- Front feet even, directly below her shoulders about 10-15 cm apart.
- One hind foot slightly ahead of the other (20-25 cm). The hind foot that is closest to the judge should be the furthest back, this way the judge is able to set both feet.

Activity

- List 2 things that you and your project animal are really good at.
- Name 2 things that you and your project animal have to work on.
- What is your favourite thing about 4-H so far?

Washing your calf

Keeping your calf clean all of the time is impossible, but you can help by brushing her often and making sure she is in a clean, well-bedded pen. When you are ready to wash your calf, you will need to tie her up on a non-slip surface with a good plastic or nylon halter. Remember to use a slip knot. You will need to find a spot where you are able to get water and it can drain properly, ask your parents where the best spot on your farm to wash your calf is.

Washing supplies you will need include:

- A pail
- Soft animal soap like Orvus
- Liquid dish soap like Sunlight
- Stiff, medium and soft bristle brush
- Wire brush for hooves
- Flexible hose with nozzle

To Wash Your Calf

1. Soak your calf all over. It is important to cover each ear with your hand to prevent water from getting in your calf's ears.
2. When wetting underneath the belly, keep one hand gently on your calf; this way you keep steady and the calf knows where you are.
3. Apply soap or shampoo directly onto the calf; be sure to use an appropriate amount and brush it in. You may also use a pail, fill it with soapy water and use that instead.
4. Use the stiff brush to scrub the brisket (between the front legs), the front legs and underneath the belly.
5. Use the wire brush to clean the feet, make sure you are using this brush only on the hoof, and stay below the hairline.
6. Rinse your calf, working from top to bottom; be sure to get out all the soap, as any soap left behind in the hair will cause flaking and dullness.
7. Remove excess water with the clean soft brush, brushing from top to bottom with slight pressure.
8. Use a soft clean cloth to wipe any dirt and wax from the inside of the calf's ears.
9. If it is cold be sure to put a blanket on your calf so that it does not get sick.
10. Lead animal back to its clean pen.
11. Spot wash if the animal gets dirty again before show day.

Clipping Your Calf

Clipping is an art that requires a great deal of practice. Start by familiarizing yourself with the true type model (page 11), and study your calves' confirmation before clipping. You may want to practice by clipping other calves that are not going to the show just to get the hang of it.

To clip your calf you will need:

- Clippers with regular and plucker blades
- Black and Clear Magic
- Scissors/osters
- Hot air blower
- Lubricating oil and a top line brush
- Soft, long bristle brush.

The object of clipping is to correct faults and highlight good points. This means that it will be different for every calf, which is why it is important to study your calf before, so that you know what faults you are trying to correct.

Hints for clipping your calf

1. Wash your calf before hand, but wait until she is completely dry; it usually takes about 30 min-1 hour for a calf to dry completely. This time will be longer for Jerseys, so be sure to give yourself enough time.
2. Tie your calf with a rope halter, using a slip knot. Tie her to a steady gate with her head slightly up.
3. Use the regular blades to clip your animal's head, neck, tail and legs. All hair on the inside of the leg should be trimmed also.
4. Leave hair on the topline; this hair should be blown straight up with the blow dryer.
5. Use the plucker blades for the rest of the body. Leave hair under the belly if necessary.

Remember that it will take skill and practice to learn to blend the hair.

Do the first clipping 3 weeks before the show and the fine trimming 3-7 days before the show.

Trimming Hooves

It is also important to get your calf's hooves (feet) trimmed before the show, this will allow your calf to stand correctly and walk with more style. This will not be something that you can do; most likely a professional hoof trimmer or family member will do this for you. This should be done 4-6 weeks before the show.

Transporting your calf

To get your calf to the show on show day, you need to do the following:

- Arrange for transportation ahead of time-calves will need to be transported in a trailer.
- Before putting your calf in the trailer, take a look and make sure there are some shavings, straw or sand on the floor; this will help your animal stand better.
- It is always a good idea to have another person there when you are loading and unloading your animal.
- If you are tying your animal while transporting be sure to provide some slack in the lead (12 inches)
- If you are transporting your animal a far distance, be sure to take some feed and water, and make frequent stops to check on the animals.
- Always double check that the door is closed and secured before you leave.
- Make sure that you have all the proper paperwork/manifest completed.

On Show Day

You should bring along a plastic or wooden box with you to the show. This box should be large enough to hold all your supplies, but not so heavy that it can not be lifted. The following supplies should be taken with you on show day.

- Leather show halter (should fit your calf and be an appropriate colour)
- Good quality hay
- Beet pulp
- Small quantity of grain
- Water pail
- Fork for bedding and cleaning stalls
- Straw
- All of your washing supplies
- Work clothes including boots, and a set of clean whites for the show

Check with your club on these supplies, as some of them may be supplied by the club or can be shared with other members.

Arriving at the Show

- Arrive early.
- You and fellow 4-H members will have to create a bed for the calves. Do this by distributing about 12 inches of straw on the ground, add some shavings and then another layer of straw (4-5 inches). Pack it down, add some more shavings and use a fork to straighten in out.
- Tie up your calf, about 3 feet away from the calf next to it, and allow enough slack on the rope that your calf is free to eat, drink and lie down.
- Put hay in front of your calf.
- Allow the calf regular access to water every 8 hours.
- Now that your calf is settled, be sure to pick up a program for the show, as well as getting started on putting up stall signs.
- Someone should remain with the calves at all times to pick up manure.
- If visitors pass by your stall, remember to be friendly and answer any questions they may have.

Showmanship Score Card

This is where all your hard practice will show. It is important that you are alert and neat in the show ring. Be aware of the judge at all times, avoid distractions and respond quickly to requests from the judge. Be courteous and a good sport at all times. It is important to show the animal to the best of your ability. Keep showing until the entire class has been placed and then dismissed out of the show ring.

Showmanship Scorecard	
Appearance of animal	40%
<ul style="list-style-type: none"> • Condition, ideal weight • Grooming, clipping • Cleanliness 	
Appearance of exhibitor	10%
<ul style="list-style-type: none"> • Clothes and person, neat and clean • White pants and shirt (no logos worn for 4-H shows), with black belt and shoes 	
Showing the animal in the ring	50%
<ul style="list-style-type: none"> • Leading • Standing • Showing animal to its best advantage • Poise, alertness and attitude 	
Total	100%

For more information on showing, ask your leader or an older 4-H member, your club may also have a copy of a showmanship video that you can borrow.

You can also go on the internet, with the supervision of a parent, and go the link below:

<http://www.holstein.ca/english/Shows/index.asp>

Once there, click on any of the showmanship reference material (such as *"Preparing to Lead"*) to see pictures and descriptions of what is expected of you in the show ring. You can also find information regarding show ethics and rules and regulations.

Leading to Win



Showmanship



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Note: *he* is interchangeable with *she* throughout this publication.

Holstein Canada remains a strong supporter of youth and young adult programs and activities. It is pleased to provide this relevant resource material to enhance showmanship skills throughout Canada and around the world.

Photography compliments of Patty Jones (CLP)

Showmanship ... Leading to Win

Like most competitors, you'd like to win in the show ring. Key in showmanship is showing your animal to its best advantage with natural ease and without extreme effort.

Showmanship is a complete package of little things done right, while correcting faults as best as possible.

Showmanship is an art and talent.

It is about being relaxed and calm.

The time you spend showing is the culmination of efforts made long before you enter the ring. Your calf has been halter broken and well trained through hours of repetitive handling. It is accustomed to other people touching it and remains calm during distractions.



This competitor shows the appropriate size of calf.



This heifer is too large for the competitor.

The calf has been washed thoroughly at home and again at the show so its hide is shiny and the white is clean.

The ears and eartags are clean.

The feet are clean and well shaped.

The muzzle is wiped free of hay and beet pulp before entering the ring.

Your animal has been recently clipped for the show.

The calf has been filled well at the show, but not to excess. She should feel comfortable and settled in the ring.

An effort should be made to ensure that the calf is not in heat on achievement day. While this is detrimental to the competitor, it also disrupts the entire class. This should be managed at home before the show. However, the judge shouldn't be too critical as many calves are not owned by 4-H members. It may be impossible to have the calf right for all shows held close together.

As a keen competitor, you wear appropriate, clean-white clothes and hard-soled shoes.

You exhibit good posture.

You do not chew gum or tobacco.

Your hair is neat and tidy.

Foremost in showmanship is a good-fitting halter, which enhances the appearance of an animal's head.

A poor-fitting halter detracts from a desirable head.

With a properly-fitted halter, your hand or part of the hand is under the chain, but fingers are not through the ring.

Approximately three loops (not a figure 8) in a short lead-strap prove manageable in one hand. This prevents the loop at the top of the 8 from being in the animal's eye. Also, you can easily reach back and set your animal's tailhead, and then regain the loop.



With this properly-fitted halter, the hand is under the chain, but not through the ring. Approximately three loops in a short lead-strap are manageable.



This halter is held correctly.



This shows a poor-fitting halter, which is also held incorrectly. The loops in the lead-strap are held in a figure 8 shape. The loop at the top of the 8 is in the calf's eye.



The lead-strap is wrapped in a tight loop; it may even be taped together. This does not display the accepted use of the lead-strap.



This competitor has the hand on the point of the calf's shoulder to steady it.



This competitor holds the calf's throat at the turn of the jaw, which gives a more dairy appearance to the animal. However, this is done only after all other faults have been corrected.

Walking into the ring, walk briskly using your left hand to lead the calf. You walk fluidly in unison with your well-trained animal.

If holding the throat gives a more dairy appearance to the animal, it should be held when entering the ring. Hold the throat at the turn of the jaw. However, if the calf doesn't need the throat held, don't do it.

If you are unlucky and have a calf with a bad disposition, you will receive credit if you get it under control and settled down during the class.

In showmanship classes, when the last calf is in the ring, turn around and start showing your calf.

The left hand should always be used to lead the calf—never the right hand unless an injury or accident prevents this.



Competitors walk forward into the ring.



Moving around the ring, there is good spacing between calves.

Ensure approximately five feet is between you and the animal ahead. Also, allow approximately five feet between you and the ring boards, so both you and the judge can maneuver easily. This allows the judge to view your animal from both sides.



Moving out of line and getting too far into the ring is a serious fault.



Avoid unacceptable actions that detract from showmanship.

- 1) walking backward slowly into the ring
- 2) sidestepping
- 3) displaying a tense behaviour; your calf can feel a tense hand on the halter
- 4) projecting a no-care attitude
- 5) showing with a long, stiff arm
- 6) keeping your elbow up
- 7) crouching
- 8) positioning yourself too far ahead of the calf
- 9) holding the calf improperly with the hand and lead-strap up in the air
- 10) holding the calf's head too high
- 11) twisting the calf's head
- 12) tucking the lead-strap through the exhibitor's belt loop
- 13) having loops of lead-strap taped together
- 14) carrying a cell phone in a pocket or on the belt



This competitor is grandstanding by moving out of line and closer into the ring toward the judge.

When the judge is in the middle of the ring and you are asked to stop, set up your calf with faults minimized, as quickly as possible. Straighten the topline, set the tail between the pins, correct feet placement and, pinch the loin or other applicable spot, if necessary—do whatever it takes to make the animal look its very best.

Then, if holding the throat gives a more dairy appearance to the animal, it should be held whenever the judge is looking. The exception is when the judge is observing the animal on the left or competitor's side. However, **correcting animal faults or maintaining animal control should not be compromised for the sake of holding the throat.** And, if an animal doesn't need the throat held, leave your right hand on its point of shoulder for control.

If the animal steps out of balance or is not straight in line, place the right hand on the point of shoulder to steady and control it. Reposition the feet, if needed.



This competitor pinches the calf's topline in the correct location. For this animal, it is the loin that requires attention.

Prior to the show, ask your parents or an advisor if and where the topline on your calf needs pinching. If it's the loin, know where it is located on the animal. In attempting to straighten the topline, many competitors pinch an area too far forward or too far back.



The throat is being held by this competitor, which gives a more dairy appearance to the animal. This should be done only after all animal faults have been corrected.



The throat is not being held.



This calf shows good head carriage.

Remember one good or bad look at an animal can change a judge's view or opinion in a second.



Occasionally, a calf will sag through its front end, especially behind the shoulders. Use your hard-soled shoes to gently touch the calf's front foot so it slightly raises it and replaces it underneath its body. Just by adjusting the calf's weight will tighten up the entire front end.

The competitor who should win is the one that an owner would hire to show his animals in conformation classes.



Be mindful that the judge observes and assesses a number of things during your individual look:

- correct spacing (five feet, approximately) between your calf and the one ahead
- staying to outside of ring (five feet, approximately). While you do not want to *bug* the outside of the ring, you do not want to crowd in closer to the judge.
- clean and neat white attire with hard-soled shoes
- confidence
- on the move, good positioning in relation to the calf, allowing the flexibility to start and stop; basically, anything can be done from this position
- a properly-fitted halter with the hand or part of the hand under the chain, but fingers not through the ring. Approximately, three loops in a short lead-strap is manageable.
- a well-presented calf with no hay or straw underneath its belly or in its mouth
- the calf handling well
- a calf with the appropriate head carriage, based on the physical characteristics of the calf
- you and the calf moving in unison
- the calf's head tipped slightly when the hide is felt
- the calf set up quickly when stopped
- the calf's head straightened when the judge moves to the rear
- from behind, the calf straight from poll to tailhead



The first competitor is the ideal distance from the outside of the ring. The second competitor stands too close to the boards for the judge to move around the calf to view it from the other side.

When the judge motions for a stop to walk around the calf, ideally lead it into an attractive, standing position.

As the judge moves around your animal, go ahead one short step. This gives the appearance of a long-bodied calf. A calf's hind feet should be four to eight inches apart. Competitors should know the best procedure to accomplish this.



When the judge first approaches the competitor, the calf's head should be tipped slightly toward the judge.



When the judge nears the calf, the competitor puts his hand on the calf's shoulder to steady it.



The competitor stands in the ideal position with the calf's feet placed correctly. The calf's head is turned slightly toward the judge as he handles the hide.



The competitor has ensured that the calf's spine is straight—nose to tail. The competitor also pinches the loin (because this calf requires this adjustment) when the judge observes the calf from the rear.



The competitor allows the judge to get a full-end view of the calf.

Give the judge a front-end view of your calf when he walks around the front of the calf.

When the judge returns to the other side, or to the centre of the ring, move ahead another short step. This should be done smoothly, and not be over-exaggerated.

Never touch the rear feet



If asked to move ahead by the judge, pass briskly on the inside of the ring.

Respond promptly, if motioned to move ahead when circling the ring. Move up quickly on the inside. An animal of manageable size is quite often easier to handle, especially in this situation.

When pulled into line from the outside of the ring, walk smartly the same way as you entered the ring.

Upon reaching the lineup, turn, and lead the calf into place, setting it up to advantage. Adjustments are made to the loin, crops, and tail setting, as necessary. Use the halter to move the animal ahead or back, if rear feet require repositioning.

Maintain a uniform lineup with the front feet of the animals in line.

Keep your animal alert, and be aware of the judge's location at all times.

The first calf in the lineup should have its left (outside) hind leg back. The last calf should have its right (outside) hind leg back.

For all other placings, the feet should be solidly positioned to show the calf's least amount of faults and to display it to its very best advantage.



The competitor's hand is on the calf's shoulder. The left (outside) hind leg is back. The competitor lightly uses her own foot to correct the front feet of the calf.



The positioning of the feet on the first and last calves is correct. All other calves in line have their feet placed solidly under their bodies, displaying them to best advantage.

As the judge moves behind and down a lineup, keep your animal straight with good spacing between it and others.

The competitor should place the right hand on the point of shoulder to steady the calf.



The judge is behind the lineup. The competitor, with his hand on the animal's shoulder, does not need to hold the throat the entire time. However, the first place may want to hold the throat, if needed, as this animal is in full view of spectators.



All calves are standing solidly on their feet. There is good spacing between calves.

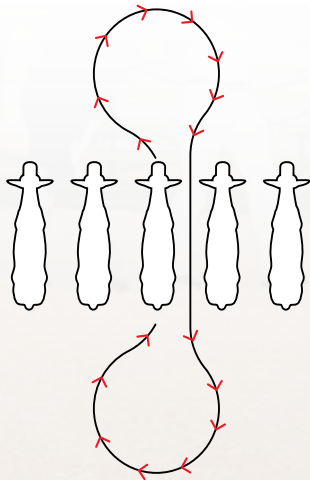
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Correcting animal faults or maintaining animal control should never be compromised for the sake of holding the throat. And, if an animal doesn't need the throat held, leave your right hand on its point of shoulder for control.

The practice of moving calves up or down the line is not recommended in showmanship classes unless the competitors are very close. However, if asked or you must correct how your animal is standing, the following procedure is advised.

Take the halter in the left hand, walk forward, continue clockwise around the calf, and back through the hole.

Go around the calf and, upon reaching the lineup, turn and walk backward as you lead it into position.



Calves in line should move to make room for your animal.

An alternate, permissible method of changing position, if easily managed, is backing your animal out of line. This should be practised at home.

If you are first or last and your calf is out of line, lead the calf forward giving yourself enough room to circle before turning and walking backward to lead your animal into its original position.

If asked by the judge to move out of line at the top of the class so he can get a better look at the animal, lead the calf forward. When coming into view of the judge, or asked to stop, turn and walk backward while the judge is looking, until he indicates for you to move on.



If the judge desires a better look at the top animals in a lineup, he has the option of pulling out a few for closer inspection. Moving counter-clockwise off the top of the class, the competitors walk backward to display their calves to the judge.



After the judge has viewed the top animals and motioned for competitors to return to the lineup, competitors turn and walk forward back into line.

You will be very seriously discriminated against if you move excessively in and out of line without instruction from the judge.

Don't

- continuously circle with your animal without instruction from the judge
- leave big spaces in the lineup
- crowd animals too tightly side by side

When the judge is moving down the front of the lineup, stand to the side where, with minimal movement, you can observe the judge easily. This allows the judge to view the front end of your animal.

The calf's head slightly follows the judge.

After the judge has moved by and has observed the front end of your animal, you should hold the throat, if needed. If the judge takes one last look back down the lineup, he expects to see a nice lineup of heads and necks.



Each competitor places his right hand on the calf's shoulder as the judge is about to walk down the front of the lineup. Competitors move fluidly to the side to give the judge a front-end view of the animal. The calf's nose slightly follows the judge.

After the judge motions for you to circle from a lineup, walk ahead with the lead-shank in the left hand until the judge focuses attention back to the moving animals. Then turn and walk backward.

When the judge indicates for you to move into line, move briskly into the designated spot.

You could be requested to lead counter-clockwise off the top of the line in conformation or showmanship classes. If this happens, walk backward with the left hand holding the halter. The right hand should be used to hold the throat (if needed) or placed on the point of shoulder to steady the calf.

When motioned, turn forward and walk quickly back to line.

Leave at least five feet between your calf and the calf ahead when you are asked to move from one lineup to another second lineup ahead.

Turn around and walk backward into line so the judge can see your animal, once the previous animal is in line.



Walking forward, competitors lead their calves out of line.

It is left to the discretion of the judge whether he wants top championship competitors to switch calves—this would only be done in very close situations and in head-to-tail positions.

Good showmanship isn't tough. It's actually quite easy if you follow these pointers.

Remember—the most important thing is to remain relaxed. Also, know your heifer's faults and how to correct them before coming into the ring.

Never presume the outcome if involved in a championship class. The judge has the option to change placings in showmanship.

A contestant should not be upset if an animal, causing a problem, is asked to stand to the side or leave the ring. This is done for the safety of other competitors and calves.

Have fun.

Don't let up until you've left the ring. For the judge and spectators, it's very disheartening to see competitors let themselves and their animals fall apart after final placement.



Thanks to keen competitors (l-r) Shea O'Neill, Cindy Hill, Davina MacKay, Ellen Hargreaves, Becky Quickfall, and Matt Van Osch

Showmanship Discriminations

Slight

Competitor

- has too long or too short a lead-strap
- has halter improperly looped
- uses a tie or tape to keep lead-strap rolled
- wears inappropriate footwear with pants tucked in boots
- is inappropriately dressed
- has inappropriate size of calf for competitor

Calf

- head not turned slightly when hide felt
- is not kept alert
- older heifer is in heat

Moderate

Competitor

- has poorly-fitted halter
- holds halter incorrectly
- not in correct position to calf
- spends too much time looking at calf
- concentrates too much on watching judge
- doesn't see or obey signals
- leaves insufficient spacing between calves on move
- allows insufficient spacing between calves in line
- crowds in line
- has stiff, outstretched arm
- sidesteps when leading calf
- is uptight and not relaxed
- exhibits poor posture

Calf

- feet not trimmed
- feet not reversed
- throat not held, if required
- switch not brushed and fluffed
- muzzle is not wiped clean
- is not straight, head-to-tail

Serious

Competitor

- does not display calf to best advantage
- is late for class
- chews gum or tobacco
- carries or talks on a cell phone
- displays poor sportsmanship
- walks slowly backward into ring
- projects lack of interest
- has fingers in ring of halter
- has hand and lead-strap above calf's head
- has arm and elbow up
- crouches
- does not walk quickly into line
- does not allow sufficient space for animal changing position
- uses own feet to reposition calf's rear feet
- walks wrong way around calf
- fusses with calf to extreme
- moves excessively in line
- is too close to outside of ring
- is **too far into ring**

Calf

- is not well washed, including ears, tags, and feet
- not trained
- not clipped recently
- nose in air
- rear feet not positioned correctly
- has hay/straw on stomach or in its mouth

Attributes of Top Competitors

Competitors:

- appear relaxed—not robotic-like
- are competitive, but not overconfident
- remain calm and cool, regardless of situation
- possess good posture, indicating they are confident in their skills
- know the faults of animals they show and have the ability to correct them
- choose the appropriate-size animal to complement their size
- select a halter that fits the animal and that they are comfortable using
- move neither too slow or too fast as they don't want to create any distraction
- keep the animal moving in the ring as much as possible—rather than standing. Most cattle look better in motion.
- look professional in appearance and clothing

Showmanship is a complete package—the combination of a lot of little things. Good competitors use cow sense and common sense.

#6



After winning the class, this professional-looking exhibitor turns and walks forward at a good pace out of the ring. All the while, the animal continues to look its best.

Judges Share Secrets for Success

Competitors:

- remain professional at all times, regardless of the situation, in and out of the ring. They respect other peers, participants, spectators, and judges.
- are on time for every class
- continually follow the judge's requests and directions
- act relaxed and confident, but look like they want to win
- respect the ring steward, as well as ring custodians
- work the ring well and allow adequate spacing between animals to show an individual animal to its best advantage
- ideally, spend as much time as possible walking the animal; it always looks better on the move
- ensure the animal looks comfortable when standing, with its feet solidly underneath its body
- position the animal so the judge can see it at all times
- walk the animal into the ideal position in line. After adjusting the topline, front feet, etc., they don't fidget with it unless it moves and needs repositioning.
- refrain from talking to the judge, unless asked a specific question. However, a 4-H member should know the name, age, and sire of his heifer.
- never give up! Because someone is always watching, they show their animals to their best advantage for the entire time in the ring.
- always make time for photography requests; world-wide exposure is great for everyone



Don't become discouraged if you are not pulled first. Every moment is a second chance to turn it all around.



This competitor firmly holds his animal with the left hand. He uses his right hand to correct the animal's faults, to steady it, and to ensure that his exhibit looks its very best at all times for the judge.



These mature competitors have studied their entries before entering the ring and have identified what weaknesses need protecting. If needed, they know exactly where to pinch topline. They can also discern when to stop fidgeting with their exhibit and be ready for the judge's inspection.



Look natural and remain relaxed—don't move like a robot!

The Ideal Showmanship Judge

You are judging showmanship—not conformation

The Canadian showmanship judge:

- has viewed and digested the contents of the Showmanship ... Leading to Win manual and DVD prior to each showmanship judging assignment (competitors and parents have also studied the teaching guidelines carefully)
- has agreed to follow all showmanship guidelines as presented in the manual and DVD. If a judge does not agree with any guidelines, he is requested to decline the showmanship invitation as competitors and parents follow them closely.
- is cautious about accepting showmanship duties that include close family members and friends. A judge should always be viewed as unbiased.
- prepares mentally for showmanship—the same as for conformation. Competitors take showmanship very seriously.
- is well rested and has a clear mind

Competitors should be placed on their abilities, not mistakes. If a competitor can recover from a minor mistake, he shouldn't be penalized too heavily.



- has the cell phone number of a contact person at the show in case of travel or other problems. For the entire show, the judge turns off all electronic devices and does not take or make calls between classes.
- arrives at the show at least 30 minutes prior to starting time.
- discusses with show management prior to the show 1) total number of entries, 2) total number of showmanship classes, 3) allocated time and conclusion time for all showmanship classes, and 4) maximum number of animals to return from each heat so final (championship) group is not too large to manage effectively

Showmanship judges should encourage show committees not to overload classes. There should be sufficient room for competitors, calves, and the judge to move easily.



- only uses ring steward to 1) ensure competitors get into the class, 2) indicate where to start lineups, and 3) where competitors should exit ring
- never consults with the ring steward about placings
- displays confidence and professionalism, without arrogance
- places competitors as they perform at the time of showing, discounting previous performance. Competitors may perform differently from show to show.
- dresses professionally—no blue jeans. Men wear a suit, or sports jacket/pants, with tie. Women wear a suit, or dress pants and jacket/vest. Judges do not chew gum or tobacco in the ring. Showmanship judges are professionals, which provide an opportunity for young people to look up to in the dairy business.
- uses **competitor** to describe each contestant, whether male or female. However, **showperson** or **leadsperson** can be used for variety.

#11

The showmanship judge selects competitors who have the natural ability to show an animal. Keen competitors must be identified and placed on top, rather than those just going through the motions.



The judge gives clear direction to competitors.

- keeps calves moving around the ring as much as possible, rather than having them stand. Most cattle look better in motion.
- wants competitors to keep circle on outside and stay straight in lineups
- never judges a competitor in a corner. He allows the competitor to work his way out of the situation without the judge's attention—then he is assessed.
- never judges a competitor in front of the entrance or exit as the calf may want or attempt to leave the ring. This also applies to groups of animals that warrant further inspection.
- is not too critical of a competitor with a calf in heat as many calves are not owned by 4-Hers. It may be impossible for the calf to be right for all shows as four or five shows may be close together.
- decides during the championship class whether to have top competitors switch calves. This would only be done in very close situations. It is recommended that calves be switched (maximum four) in a head-to-tail lineup, starting with the lowest-place animal. The ring steward holds the fourth-place animal, while the fourth competitor moves to take the third calf; the third competitor moves and takes the second calf; the second competitor moves and takes the first calf; the first competitor moves on the outside and circles behind to take the fourth calf from the ring steward. This allows each competitor to quickly analyze the animal he is going to lead.

#12

Before studying each individual competitor for showmanship abilities, the judge should quickly assess the calf to ascertain what traits the competitor should try to protect.

- is willing to give a second-place competitor a second chance to win in a championship class. While animals do not change, the second-place competitor may have corrected all faults indicated by the judge and actually excel over the first placer in the championship class. If this is the case, this competitor should win as long as good reasons can be given to support the placing. Remember that if you have given two or three reasons to the second competitor, you must also tell the top competitor how he can improve.
- *shakes* up the way he judges showmanship within the general guidelines. For example, rather than just looking at one competitor at a time doing the same routine (competitor leads calf up to judge, judge goes around calf, competitor moves foot, etc.), he lets two or three calves go by. The judge does not always want competitors to know what he's doing—keep competitors on their toes and make them think.
- visits the barn following the show to talk to exhibitors and parents

Giving Good Reasons

Give reasons one-on-one to all competitors at smaller shows as everyone wants to learn and discover how to improve himself. These reasons must be positive and accurately explained. You should start at the bottom and make your way up the line to where you would give reasons over the microphone—usually first to sixth place. The first to sixth competitors will hear reasons for their placings over the microphone.

At larger shows, you may want to talk to the lower-placing competitors as a group. Then make your way up the line to where you will give reasons over the microphone. The first to sixth competitors will hear reasons for their placings over the microphone.

Taking the microphone, briefly stand behind the top six competitors to organize your thoughts before delivering your reasons. You should test the microphone ahead of the show.

Stand straight, but relaxed.

Be positive. Be accurate. Give reasons that reflect the class being judged.

Speak slowly, crisply, and confidently into the microphone so competitors, parents, grandparents, and spectators can absorb your reasons for placings.

Start your first set of reasons of the day with a cordial statement indicating your pleasure/honour to be invited to judge the show.

Use only descriptive terminology at the beginning or end of a set of reasons to generally describe the contestants, or the first-place competitor. For example, there are many great competitors in this class; the first three competitors caught my attention as soon as they entered the class.

Always start with the most important reasons as to why a competitor places over another. Use **comparative** terminology that compares one competitor to the next competitor.

The obvious points of difference should be your primary concern.

Do not get into the routine of using the same reasons and phrases for every class. All classes are different.

On close placings, grant an obvious advantage to a lower-placing competitor.

Recognize the competitors are the main attraction; do not grandstand.

Conclude the entire show with complimentary remarks about the quality of competitors, etc. Everyone involved with the show wants it to conclude on a positive note.



Before giving reasons on a showmanship class, this well-dressed judge briefly stands behind the top competitors to organize his thoughts.



This judge projects confidence; he stands straight, but relaxed. He speaks slowly and crisply into the microphone to ensure that everyone can absorb his reasons.



This judge uses comparative terminology to compare one competitor over another. Speaking positively and accurately, he grants an obvious advantage to a lower-placing competitor.



Holstein Canada

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SHOWING RING ETHICS

Dairy cattle shows have been happening since the late 1800s – they provide opportunities for exhibitors to compare their cattle to others, market their animals, and network and develop relationships with other dairy exhibitors. However, many people find it difficult to participate because of the unethical show preparation procedures of some individuals.

Competing to win is healthy, but not if it means jeopardizing morals, integrity or animal health. It is important to convey a positive image of dairy farming to the general public so that they feel comfortable about where their food comes from, and the farmers who produce it.

Misrepresenting information, like falsified birthdates, effects the integrity of registration processes in Canada and is unfair to other exhibitors. Preparation procedures like tail freezing (which can cause permanent paralysis) and injecting substances into udders contravene the Code of Ethics and can be detrimental to the animal.

As 4-H members, it's important to take responsibility for our actions and participate in shows in an ethical manner.

Each dairy breed in Canada has its own Code of Ethics, although they are all very similar. The Code and its penalties for showing Holsteins in Canada can be found on the next page. To help ensure integrity in the dairy show ring, dairy cattle exhibitors at shows across the country are now required to sign agreements stating that they will abide by the rules; these are also included.



Holstein Canada

NAME OF HOLSTEIN SHOW: _____

STANDARD EXHIBITOR'S AGREEMENT

CANADIAN DAIRY BREEDS

Farm Name _____ Individual Name _____

Address _____ City _____

Province/State _____ Postal Code/Zip _____ Country _____

Tel. _____ Barn Tel. _____ Fax _____ E-mail _____

AGREEMENT, DECLARATION, AND WAIVER

THE UNDERSIGNED, ON BEHALF OF THE EXHIBITOR AND ALL PRINCIPALS AND REPRESENTATIVES OF THE EXHIBITOR, DECLARES THAT HE/SHE HAS READ, FULLY UNDERSTANDS, AND WILL COMPLY WITH THE RULES AND REGULATIONS FOR SHOWING.

If entry is accepted by the Show organizers, the undersigned on his or her own behalf and the exhibitor and the principals and agents of the exhibitor acknowledge and agree that they and each of them:

- (1) are bound by, and will act at all times in accordance with the Rules and Regulations for Showing Dairy Cattle, and Standard Procedures and Penalties for Enforcing Rules and Regulations for Showing Dairy Cattle, and will accept any final decision made thereunder;
- (2) accepts that any action which may be taken under the above may be reported to any Association registering purebred livestock; and
- (3) release and agree to hold the Show and its officials, directors, officers, employees, representatives, agents and volunteers (collectively the "Show organizers") harmless from any action taken under this agreement, the Rules and Regulations for Showing Dairy Cattle, the Standard Procedures and Penalties for Enforcing Rules and Regulations for Showing Dairy Cattle, or any other show rules and regulations, and release the Show organizers from and against any injury, damage or loss suffered during or in connection with the Show, whether or not such injury, damage or loss resulted from or was contributed to directly or indirectly, by the acts or omissions of the Show organizers.

The undersigned further certifies that:

- (1) any animal entered is not currently barred from showing at any future dairy show in North America; and
- (2) no owner of the entered animal, whether direct or indirect, is currently barred from showing any other animal at any future dairy show in North America.

I declare by signing this entry that:

- (1) the entry information provided to the Show organizers is true and correct;
- (2) I have the authority to make this AGREEMENT, DECLARATION, AND WAIVER, and to bind all persons and enterprises with any interest in the entered animal(s) to the terms of this AGREEMENT, DECLARATION, AND WAIVER, and do so bind them, their agents, heirs, successors and assigns or, to the extent that I do not have this authority, will ensure that such person(s) sign this agreement;
- (3) I and all other persons and enterprises with an interest in the entered animal(s) accept full responsibility for my actions, and for those of anyone else, including but not limited to fitters, who are involved in the care of, show preparation and/or showing of the entered animal(s).

I HAVE READ, UNDERSTAND, AND AGREE TO THE ABOVE

X

Signature, Owner or Authorized Agent/Representative

Date: _____

X

Print, Owner or Authorized Agent/Representative

Date: _____

"THIS AGREEMENT MUST BE SIGNED BEFORE ANIMALS CAN ENTER THE RING"



STANDARD AGREEMENT BETWEEN OWNERS AND FITTERS FOR HOLSTEIN SHOWS



I agree I am personally responsible for the care, welfare, and condition of your animals during the period of the Show. I acknowledge that I am responsible for my own actions and failures to act and for the actions and failure to act of all of my employees and anyone else who assists me with the fitting, care, and show preparation of your animals.

I promise that I will abide by the Rules and Regulations for Showing Holstein Cattle, the Standard Procedures and Penalties for Enforcing the Rules and Regulations for Showing Holstein Cattle, and any other show rules and regulations. I will also ensure that all of my employees, agents, contractors and others who assist me with the fitting, care, and show preparation of the animals comply with the same requirements. I understand that a failure to adhere to such requirements could result in disciplinary measures including possible suspension or ban of me, my employees and helpers, the animal(s), the owner and/or the exhibitor of the animal(s) from the Show and future Shows and the public reporting of disciplinary action, including to any association registering purebred livestock.

I release and agree to hold the Show, the Show organizers and its officials, directors, officers, employees, representatives, agents, and volunteers (collectively the "Show organizers") harmless from any action taken under this agreement, the Rules and Regulations for Showing Holstein Cattle, Standard Procedures and Penalties for Enforcing Rules and Regulations for Showing Holstein Cattle and any other Show rules and regulations, and release the Show organizers from and against any injury, damage or loss suffered during or in connection with the Show, whether or not such injury, damage or loss resulted from or was contributed to, directly or indirectly, by the acts or omissions of the Show organizers.

I HAVE READ, UNDERSTAND, AND AGREE TO THE ABOVE

Person in Charge (Print)

Signature of Person in Charge

Owner/Exhibitor Name (Print)

Date



STANDARD PROCEDURES AND PENALTIES FOR ENFORCING RULES AND REGULATIONS FOR SHOWING HOLSTEIN CATTLE



The purpose of these procedures is to put into effect the *Rules and Regulations for Showing Holstein Cattle* as published by show organizers. Where there is any conflict between the *Rules and Regulations* and these procedures, the *Rules and Regulations* shall prevail to the extent of the conflict.

1. The show organizers will ensure all owners/exhibitors sign an agreement to abide by the Rules and Regulations for Showing Holstein Cattle— either as a separate document or as part of the entry form.
2. The show organizers will appoint designated persons to act as a Rules Committee at the Holstein Show. The Rules Committee for the Show will be responsible for overseeing compliance with the *Rules and Regulations for Showing Holstein Cattle*.
3. The Rules Committee for the show, or any agent or representative of the Rules Committee, shall act as the Inspector under the Rules and Regulations for Showing Holstein Cattle, for the purpose of monitoring compliance. To help in this regard, such person(s), their agents or representatives shall have the authority to perform on any animal entered any of the following:
 - (a) an ultrasound examination of the udder, prior to and after milk-out where the possibility of such examination has been announced before any judging in the class in which the animal is entered;
 - (b) a milk-out of any individual cow or cows;
 - (c) the collection and testing of any of the animal's body fluids, at any time;
 - (d) the use at any time of any other technology, and other inspections and/or analysis—including autopsy—that the Inspector considers may be useful for assessing compliance with the Rules and Regulations.
4. The Inspector may, at any time, require the delivery of any hypodermic syringe, needle, or other device, swabs, cloths, or other material, or samples or any medicine, preparation, or substance, whether in liquid or other form, in the possession or control of the exhibitor, his fitter, agents or persons acting on behalf of the exhibitor for the purpose of laboratory analysis.
5. All exhibitors, fitters, agents, or other persons acting on behalf of the exhibitor at the show shall provide promptly to the Rules Committee, upon request, whatever information and produce any documents required by the Rules Committee for the proper monitoring of compliance with the Rules and Regulations and shall fully cooperate with any inspections.
6. The Rules Committee will try to warn an exhibitor or exhibitor's representative before showing that:
 - (a) a complaint has been received of a possible violation of the Rules and Regulations for Showing Holstein Cattle concerning the animal to be shown; or
 - (b) the Rules Committee has a reasonable belief that there would be a violation of the Rules and Regulations for Showing Holstein Cattle if the exhibitor's animal is shown.

If the exhibitor decides not to show the animal after receiving such a warning, no violation of the Rules and Regulations will be considered to have occurred and no disciplinary measures will be taken against the exhibitor. The Rules Committee will only give the above warning to an exhibitor or exhibitor's representative where the committee considers it reasonable and practical to do so and not in circumstances of disqualification of entries under the Rules and Regulations.
7. The Rules Committee shall have the option, following the judging of the milking classes, to ultrasound the udders, prior to milk-out, of a representative number of animals in each of the milking classes, or to take milk samples from a representative group of animals. If the Rules Committee undertakes the option to ultrasound the udders or to take milk samples, it shall make an announcement to this effect before the judging of the milking classes.



RULES AND REGULATIONS FOR SHOWING HOLSTEIN CATTLE



The following supports good animal husbandry practices at shows, while presenting a positive image to spectators. Rules and regulations apply at all times when animals are present on the fairgrounds; every treatment is presumed to have occurred on the fairgrounds. All treatments must be authorized and in writing by a practising veterinarian. Various methods and equipment will be used to monitor and record unethical practices or procedures, including cameras and videos. All exhibitors and their fitters, agents, or other representatives agree to abide by the following rules and regulations.

PART I

The following practices or procedures are unacceptable in the show ring of registered Holstein cattle:

1. misrepresenting the age, calving date, number of lactations, or ownership of an animal;
2. filling an animal's rumen unnaturally with liquid [tubing];
3. balancing the udder by any means other than by leaving naturally produced milk in any or all quarters;
4. treating the udder internally with an irritant, counter-irritant, or any other substance to temporarily improve conformation or produce unnatural animation;
5. treating the udder externally with an irritant, counter-irritant, or any other substance to temporarily improve conformation or produce unnatural animation (Allowable practices/substances include sealing and setting teats, and the use of external anti-inflammatory substances for the well-being of the animal.);
6. roping udders and the use of objects to physically improve definition of the suspensory centre ligament;
7. administering epidural anaesthesia [blocking tails] and/or applying any irritant either externally or internally to the perineal [rectum and vagina] area;
8. inserting foreign material/articles under the skin, into the topline [including hair not attached to its own hair follicle];
9. applying foreign material/articles on the feet;
10. performing surgery of any kind to change the natural contour of appearance of the animal's body, hide, or hair. Not included is the removal of warts, teats, and horns; clipping and dressing of hair; and trimming of hooves;
11. criticizing or interfering with the judge, show management, or other exhibitors while in the show ring; as well as any conduct that violates, directly or indirectly, recognized standard show practices, or any other discreditable conduct that could damage the image of the breed or show;
12. wrapping hocks or draining fluid from hocks unless authorized by a veterinarian appointed by the show management.
13. excessive manipulation of hair beyond 1½ inches from the skin.

PART II

All exhibitors and their fitters, agents or other representatives agree to abide by the following procedures:

1. Exhibitors, agents, employees, or other person acting on behalf of an exhibitor, shall deliver to an inspector upon request any hypodermic syringe, needle or other device, swabs, cloths or other material, or samples or any medicine, preparation or substance, whether in liquid or other form, for the purposes of laboratory analysis.
2. All entries and personal property of the exhibitors, their servants and agents and persons acting on behalf of exhibitors, are subject to inspection by inspectors authorized by a show. All such persons shall cooperate with the inspectors and shall provide all such information in connection with such inspections and shall provide access to the animal and all information reasonably required by inspectors in connection with such inspections and shall provide, if so requested, samples of urine, milk, blood, or any other body fluids suitable for analysis.
3. Exhibitors shall remove any udder supports, blankets, or other objects limiting the ability of the inspector to undertake a thorough inspection.
4. The exhibitor agrees to act at all times in accordance with the Rules and Regulations for Showing and the Standard Procedures, and will accept any final decision made thereunder.

Violators are subject to the disciplinary provisions of the Standard Procedures and Penalties for Enforcing Rules and Regulations for Showing Holstein Cattle, and/or other show rules and regulations.

For Holsteins, show rules will be enforced by the Holstein Association of Canada.

ANIMAL CARE, WELFARE AND TRANSPORTATION

In Canada, fewer and fewer people live on farms, or even see farm animals, which tends to mean that more and more people are unsure about how dairy animals are treated and this sometimes makes people worry about the milk they're drinking. They also wonder if farm animals are being mistreated. You can help to educate people by taking good care of your 4-H dairy project animal and showing off this care at your Achievement Day or local fair. You can also educate people about animal care at agricultural venues.

THE BASICS OF ANIMAL CARE

Caring for dairy animals is one of the most important parts of being a dairy farmer. There are Five Freedoms that farmers, 4-H members, animal owners and caretakers are responsible for providing their animals. These freedoms are:

1. **Freedom** from thirst, hunger and malnutrition by ready access to fresh water and a diet to maintain full health and vigor.
2. **Freedom** from discomfort by providing a suitable environment including shelter and a comfortable resting area.
3. **Freedom** from pain, injury and disease by prevention or rapid diagnosis and treatment.
4. **Freedom** to express normal behaviour by providing sufficient space, proper facilities and company of the animal's own kind.
5. **Freedom** from fear and distress by ensuring conditions that avoid mental suffering.

Canada has a Code of Practice covering the care of dairy animals to ensure that they are treated properly. The Code outlines acceptable standards for:

- Shelter and housing
- Handling and supervision
- Feed and water
- Transportation
- Healthcare
- Sales yard and processing facilities
- Breeding
- Emergency procedures
- Animal identification

Farmers are subject to laws about treatment of animals, as is outlined in the Criminal Code of Canada and the provincial Society for the Prevention of Cruelty to Animals (SPCA) Act. Those who break the rules by causing animals to suffer "unnecessary pain, injury, suffering or neglect" will be punished.

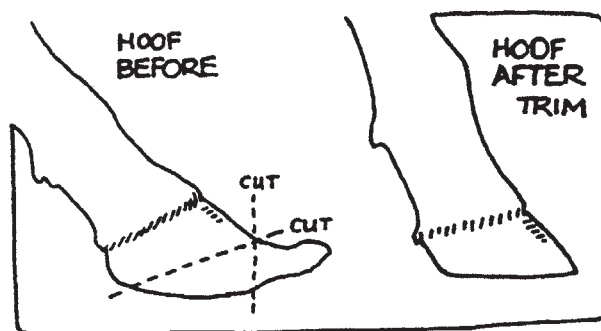
Aspects of animal care are covered throughout various sections of this project guide.

Here is an overview of the basic needs for animals:

- **Housing** – All housing must:
 - Be dry and well-ventilated to give the animal enough fresh air.
 - Have sufficient space.
 - Be cleaned and disinfected before the animal moves in.
 - Have feeding systems that are suitable for presenting enough feed.
 - Provide clean water.
 - Be cleaned and re-bedded regularly.
- **Feeding** – The feed given to an animal changes with her age, size and the stage she is at in her life cycle.
 - Newborn calves should be fed colostrum.
 - Heifers should be transitioned from milk to milk and calf starter, then to forages.
 - Dry cows should be fed rations that will ensure a healthy transition into the milking herd.
 - Milking cows should be fed a balanced ration that supports milk production, reproduction and animal function.
- **Health** – Healthy animals have several common characteristics, such as:
 - 38.1°C to 39.5°C temperature.
 - 10-30 breaths per minute.
 - Aggressive, strong appetites.
 - Clear, bright eyes, shiny coats, and adequate body condition.

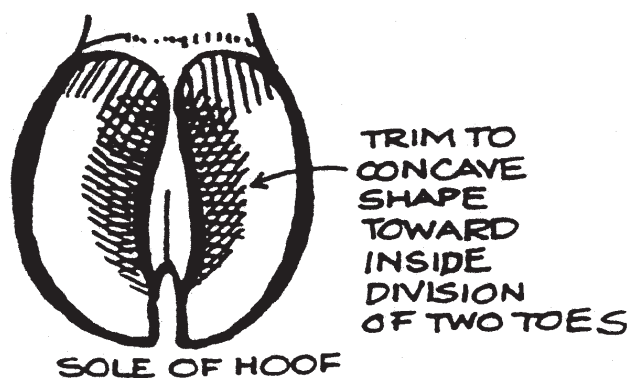
In order to keep animals healthy, it is important to vaccinate against diseases and to treat your animals for any illness they might have.

A calf's feet are also important because when animals live in soft, well-bedded pens their hooves grow too long and they can't stand properly. Regular hoof trimming helps to keep animals healthier and improves their locomotion.



SIDE VIEW

Be careful not to trim too much off!



Here are a few tips to help you talk to the public about agriculture:

- Be prepared. Try to answer questions in a way that the asker will understand.
- Know how to handle uncomfortable situations - if you are being asked difficult questions that you do not know the answer to, ask someone from your club to help you out.
- Never argue with the question asker. Instead, go and get your leader, an adult volunteer or a senior-aged member and ask them for help.

ANIMAL HANDLING

In addition to feeding, housing and otherwise providing for your animals, it is important to handle your dairy animals with care. Understanding animal behaviour is an important component to properly handling your animal.

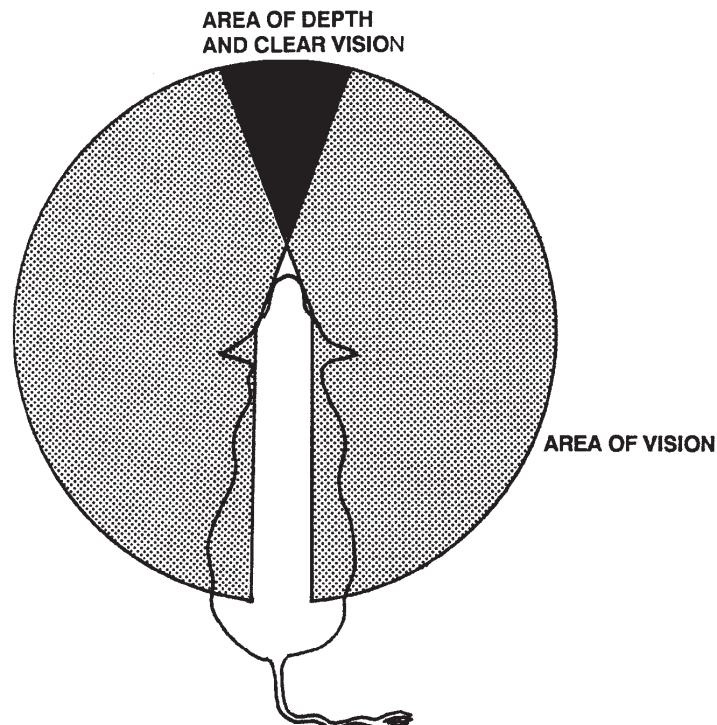
Animal Behaviour and the Environment

Animals react to their surroundings to make themselves feel more comfortable. The list below shows a few ways that animals respond to their physical environments:

- Older animals withstand colder temperatures better than younger animals because they have better internal control of their body temperatures and they have thicker, warmer hair coats than younger animals.
- Animals in cool environments will move towards sources of warmth.
- Animals avoid overheating by moving away from warm areas. In hot weather, cattle spend more time alone and search out shady, cooler areas.
- Animals will seek shelter from wind and rain.
- Cattle move best over a level surface. They don't like going uphill or downhill, especially if the footing is slippery; however, it is easier for them to move up an incline, than to go down.
- Cattle move away from disturbances in a circular fashion, allowing them to keep an eye on the disturbance.
- Cattle have herding instincts in that they want to follow other cattle. They will be quieter if they can be handled in groups rather than as individuals.

Cattle Vision

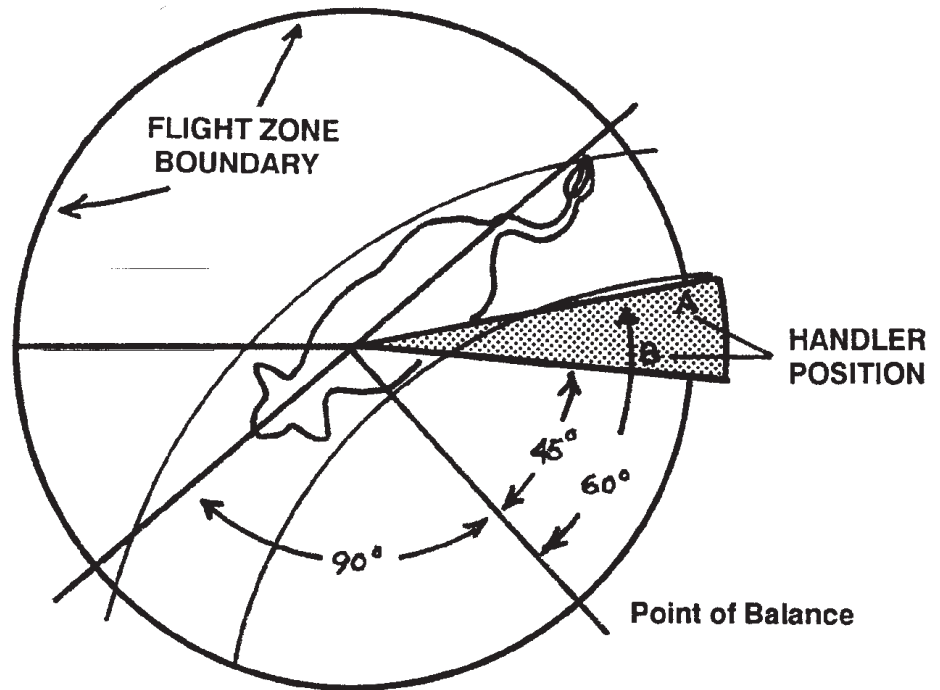
Cattle have very different eyesight than people. Since their eyes are located on the sides of their heads, they have a large total area of vision called panoramic vision. However, they can only see very clearly in a small area in front of them. The only place that a cow cannot see at all is directly behind her. This type of vision causes animals to react very quickly to movement, noise or sudden changes in lighting.



FLIGHT ZONE

The flight zone is the area around an animal that you cannot enter without making him or her move away from you. Entering the flight zone is kind of like someone invading your personal space.

Different cattle will have different flight zones based on how they have been handled and raised. Heifers who have been raised on pasture with little human contact will have a much larger flight zone than a show calf that is constantly handled and trained. As long as you stay on the edge of an animal's flight zone, it will move away from you in a circle at a steady pace. If you move into its flight zone or get too close to the animal, it will try to run away.



Whether cattle move ahead or backup within the flight zone depends on where the handler is in relation to the animal's point of balance. This point is usually around the animal's shoulder. If you approach an animal from in front of this point, it will back away from you. If you approach an animal from behind this point, it will move ahead and away from you.

Handle Animals Gently

When working with animals, handle them gently and with caution. Your quiet, soft-spoken behaviour will be far more successful in working with animals than yelling at and hitting them. The more attention you give your animals during your daily routine, the quieter they will be and the easier they will be to handle.

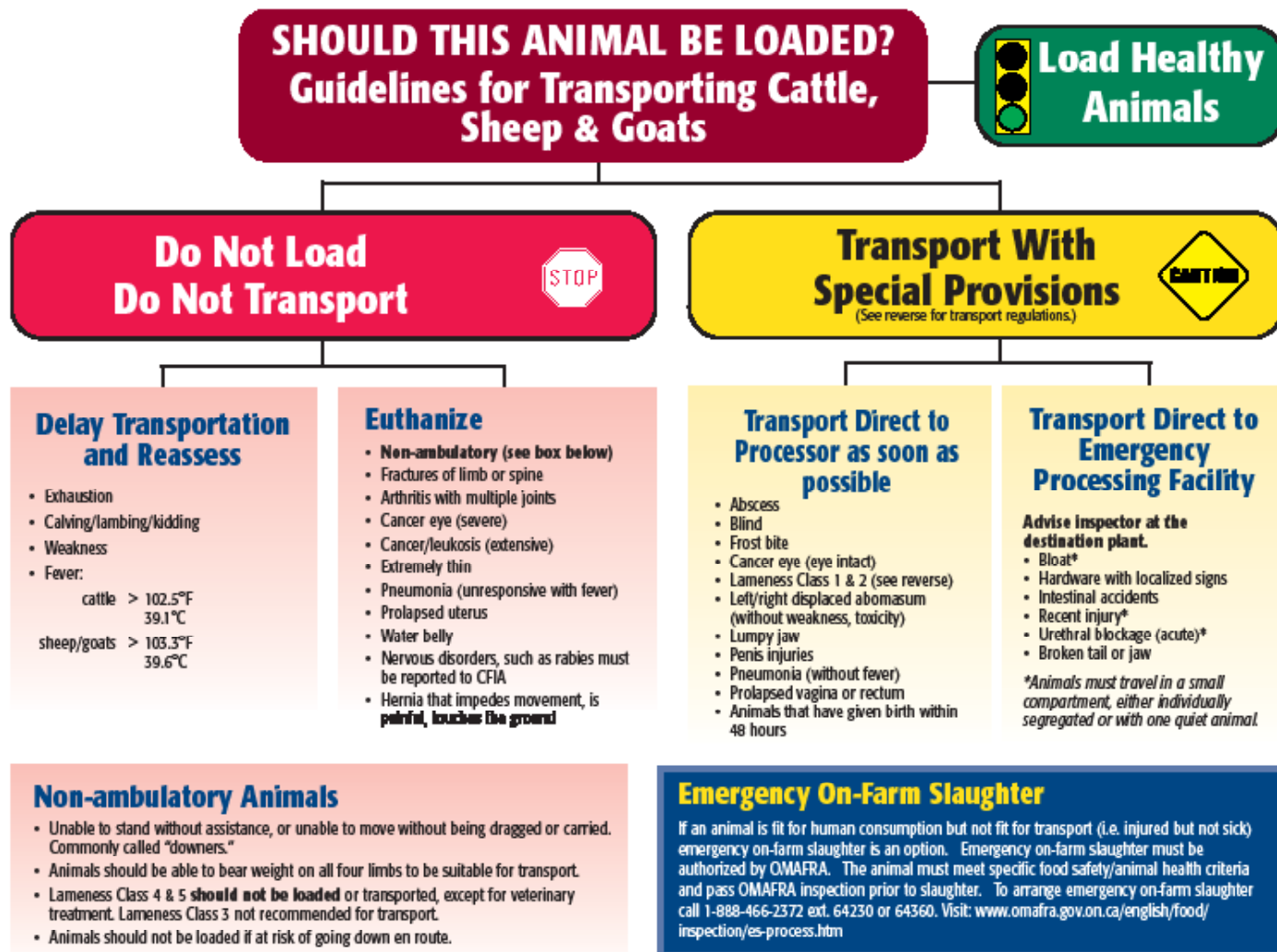
Remember, if there's one word that you should remember when working with animals, it's to treat them with RESPECT!

Your safety is a big concern with regards to a cow's flight zone, and her potential sickness, so be mindful when you are handling and leading your calf or a cow that they are quite a bit bigger than you, and could have the potential to cause you injury if an accident were to occur. As a club, a safe animal handling workshop should be held to ensure everyone's safety. Please contact Alberta's Farm Safety Program for more information (780-980-4230), and revisit the "Preparing to Lead" guide (page 43) to read more on leading your calf and clipping at home.

TRANSPORTATION OF LIVESTOCK

When loading and transporting cattle, it is important to keep their stress levels to a minimum by gentle handling, having a safe place to load animals, transporting them in a trailer that is clean, dry and has been disinfected between loads of animals.

There are times when animals should not be transported. Even though you might not want a very sick animal on your farm, it may not be suitable to transport. The chart below outlines guidelines for transporting livestock:



Source: Ontario Farm Animal Council, www.ofac.org. Accessed April 28, 2008.

REFERENCES AND RESOURCES

Ontario 4-H Beef Manual, 1999.

Ontario Farm Animal Council. "Learning About Animal Welfare" 4-H Resource, "Effective Animal Displays", "Guidelines for Transporting Cattle, Sheep and Goats". www.ofac.org.

HEALTH

Healthy Cows are Happy Cows!

Keeping cows and calves healthy is the most important part of running a dairy farm. Young calves need to be kept healthy so that they can grow to be big, strong cows in the future. Heifers and dry cows must remain healthy so that they can give birth to healthy calves and begin milk production. Cows within the milking herd must remain healthy in order to maximize high quality milk production, and to ensure repeat pregnancies.

Keeping cows healthy isn't just about giving medicine. Health comes from a proper nutrition, a vaccination program, and having good housing that is clean, dry and well ventilated.

A Healthy Cow or Calf's Vital Signs

One way to help determine if an animal is healthy or sick is to take her temperature, respiration rate and heart rate. The respiration rate refers how many times an animal takes a breath in one minute. Her heart rate (pulse) refers to how many times her heart beats in one minute.

A cow or calf's vital signs can be a range of values. They can change, just like a person's do, due to the time of day, the weather, the animal's excitement and activity level and whether or not she has been out in the sun.

Make sure that you wash your hands before and after you take an animal's vital signs. You can spread diseases from one animal to the next on your hands.

Vital Sign	Ideal	Healthy Range
Temperature	38.6°C	38.1-39.5°C
Respiration Rate	30 per minute	10-30 per minute
Heart	50 per minute	40-70 per minute

BODY CONDITION SCORING

Since a cow can't step on a scale or mark her height on the barn door, it is important to have another way to measure the body condition of a cow. Body condition is like a secondary vital sign to help determine if she is healthy.

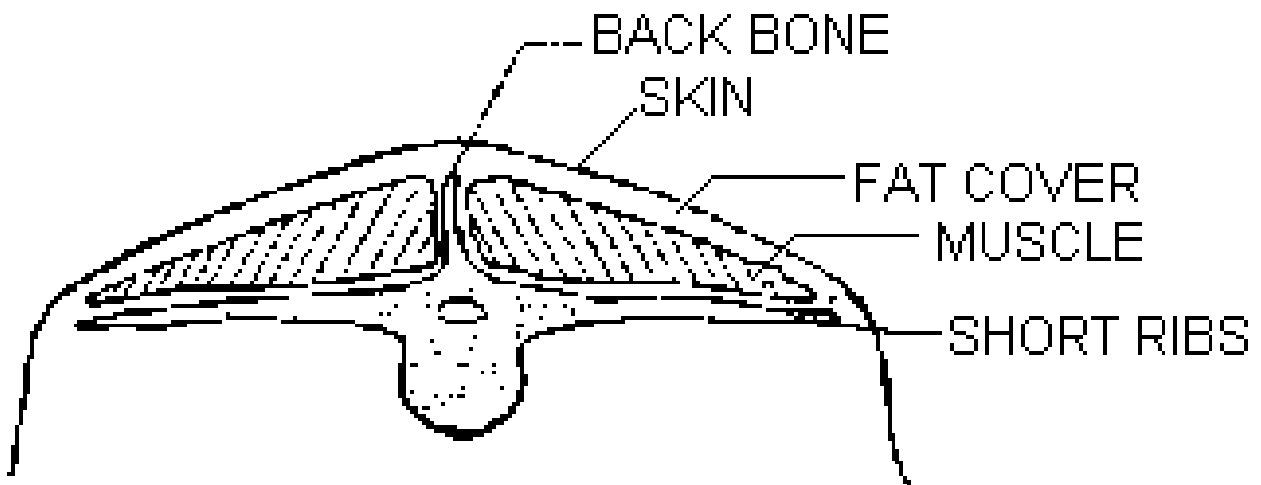
Body Condition Scoring (BCS) helps you measure, by look and feel, the amount of body fat on a cow. Fat is an energy reserve for a cow, like the battery in a plug-in alarm clock. The cow only uses it when the "power" goes out. In other words, sometimes cows need this extra 'battery' (fat reserve) when they're using more energy than what they're consuming through their feed. This is called a **negative energy balance**. The most common time a cow is in a negative energy balance state is in early lactation when she's milking more energy out than she's taking in. It takes 1kg of fat to make 7kg of milk. So you have to make sure that the heifer or dry cow's

body has enough stored fat to produce milk in early lactation. You can rate on a scale of 1 to 5 how much fat the cow has on her body using body condition scoring. A score of 1 is a very thin cow, a score of 5 is a very fat cow. Dry and calving cows should have a score of 3.5 to 4.0.

Cows with a BCS higher than 4.0 will usually have more health disorders, such as retained placentas and calving problems. Often, fat cows have a poor appetite right after calving so they eat less and can get ketosis and fat in the liver. Cows that are too fat will go “down” at calving. A “downer” cow is one that lies down and has difficulty or is unable to stand or remain standing. Although “downer” cows remain alert, they may never get back up.

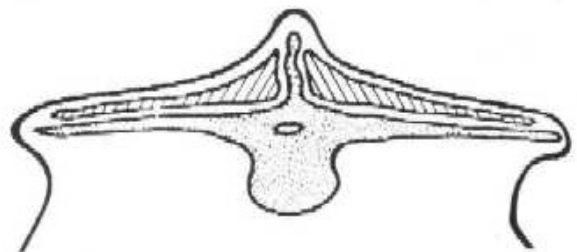
Body Condition Scoring (BCS) can be done by pressing fingertips against the **pin bone, hip bone and backbone** of a cow as well as gripping the area below the loin where the short ribs protrude from the cow’s body, to feel the amount of fat cover. With a lot of practice, body condition scoring can be done in 10-15 seconds per cow and it provides a lot of information.

Below is a diagram of the lateral view of a dairy cow



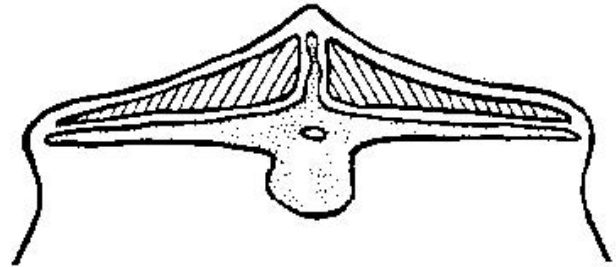
BCS 1

This cow is emaciated. The ends of her short ribs are sharp to the touch and together give a prominent, shelf-like appearance to the loin. The individual vertebrae of the backbone are prominent. The hip and pin bones are sharply defined. The thurl region and thighs are sunken and in-curving. The anal area has receded and the vulva appears prominent



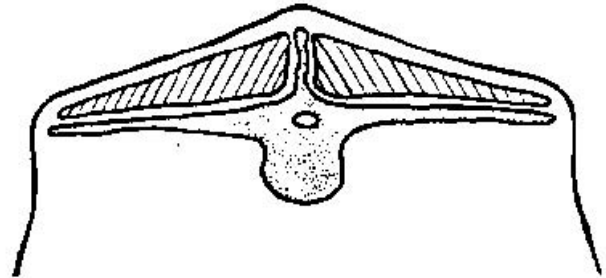
BCS 2

This cow is thin. The ends of the short ribs can be felt but they, and the individual vertebrae, are less visibly prominent. The short ribs do not form as obvious of an overhang or shelf effect. The hip and pin bones are prominent and the depression of the thurl region between them is less severe than in BCS 1. The area around the anus is less sunken and the vulva is less prominent than in BCS 1.



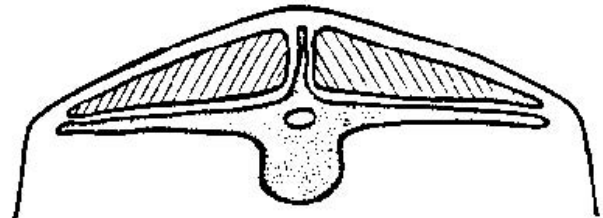
BCS 3

A cow in average body condition. The short ribs can be felt by applying slight pressure. The overhanging shelf-like appearance of these bones is gone. The backbone is a rounded ridge and the hip and pin bones are round and smoothed over. The anal area is filled out but there is no evidence of fat deposit.



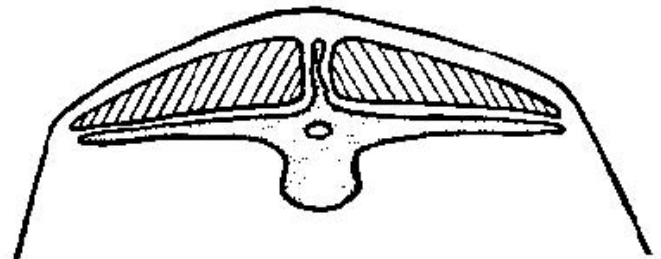
BCS 4

A cow in heavy condition. The individual short ribs can be felt only when firm pressure is applied. Together they are rounded over with no shelf effect. The ridge of the backbone is flattening over the loin and rump areas and rounded over the chine. The hip bones are smoothed over and the span between the hip bones over the backbone is flat. The area around the pin bones is beginning to show patches of fat deposit.



BCS 5

A fat cow. The bone structure of the topline, hip and pin bones and the short ribs is not visible. Fat deposits around the tailbone and over the ribs are obvious. The thighs curve out, the brisket and flanks are heavy and the chine very round.



HEALTHY ANIMALS ACT...HEALTHY!

In addition to vital sign and body condition scoring assessments, the most obvious sign of health or disease is obvious by watching the behaviour and general appearance of an animal. There are several physical characteristics of healthy cows and calves, such as:

- Eat and drink well
- Active (energetic)
- Shiny, smooth hair
- Bright eyes
- Normal manure and urine
- Milk production is normal in milking cows
- Older heifers and cows show regular heats

It is important to keep a close eye on your animals all of the time, so that you know when an individual animal's behaviour changes to indicate that it is sick.

Now that you know about the signs of healthy animals, it's time to learn about when animals get sick.

BIOSECURITY AND ANIMAL HEALTH

One aspect of farm management that helps to control the spread of disease is biosecurity. According to the Canadian Food Inspection Agency, "Animal biosecurity refers to measures that prevent the introduction and spread of disease."

Farms can develop their own biosecurity programs to help prevent diseases. ***There are several aspects of such programs that can be incorporated at the farm level. Some examples are:***

- Controlling access to cattle on the farm.
- Preventing your cattle from coming into contact with other livestock or wild animals.
- Wash your clothing, and clean and disinfect footwear and equipment that has been used around cattle.
- Maintain records regarding the movement of people, cattle and other animals and equipment to and from the farm.
- Purchase cattle, feed and other supplies from reputable suppliers.
- Separate new animals from those that have already been on the farm for a few weeks; keep animals apart until you are confident that the new animals are healthy.
- Identify all animals with Radio Frequency Identification (RFID) tags.
- Vaccinate against some diseases after consultation with your veterinarian.
- Identify signs of illness, treat sick animals as needed, and report any animals that are suspected to have a reportable disease (i.e. tuberculosis or BSE).

Beyond the farm gate, similar biosecurity measures are expected at other points in the food chain, such as abattoirs and dairy processing facilities. Beyond Canada's limits, the Canada Border Services Agency and the CFIA closely monitor animals crossing the border. Animals entering the United States from Canada must be branded or tattooed with "CAN" to indicate their country of origin. Proper identification tags must be in place on the animals, and health papers and testing must be completed. Animals entering the country must also have appropriate documentation to accompany them. This paperwork might be an inconvenience for those transporting animals, but it's well worth it if it keeps our animals and our food supply safe.

Diseases can be spread in several ways:

- Direct animal to animal contact
- By the wind
- Through feed or water
- Via contaminated clothing, vehicles, equipment, etc.
- Through wildlife, vermin or insects

For more information on biosecurity, contact the Canadian Food Inspection Agency at 1-800-442-2342 or www.inspection.gc.ca.

DISEASES

Animals get sick for many reasons. They can become ill from infectious diseases or non-infectious diseases. Infectious diseases are those that can be spread from one animal to the next, whereas non-infectious ones cannot. That does not mean that only one animal in your herd will have a non-infectious disease though. For example, if one animal has a non-infectious disease from not eating properly, other animals in the herd may have the same disease because they are also not being fed a proper diet. Some diseases caused by bacteria and parasites can spread from animals to humans. Such diseases are referred to as "zoonotic" diseases.

INFECTIOUS DISEASES ARE CAUSED BY:	NON-INFECTIOUS DISEASES ARE CAUSED BY:
<ul style="list-style-type: none"> • Viruses • Bacteria • Parasites 	<ul style="list-style-type: none"> • Poor diet • Stress • Heredity • Toxicity • Tumours • Injury

PREVENTING DISEASES

Preventing both infectious and non-infectious diseases is the best way to keep animals healthy. Preventing diseases before they happen costs less than treating sick animals to make them healthy again. This is because prevention involves no milk losses, medicine costs or animal losses.

Herd health programs are designed to keep cows healthy through different stages of their lives. The largest component of regular herd health visits by a veterinarian is reproductive health, which examines cattle at various stages of their reproductive cycles to check pregnancy or determine problems when reproductive failure occurs. Reproductive herd health is discussed in more detail in the "Reproduction" section of this manual. Herd health visits are also the best time to consult with your vet regarding other matters, such as production, vaccinations, or any outbreaks that may be occurring in your field. A herd health program is one that you shouldn't try to develop on your own. Veterinarians play an important part in developing these programs. Breed magazines, discussions with other farmers about their successes and challenges, Alberta Agriculture and Rural Development publications, and the internet are all good sources of information.

One of the goals of herd health is to prevent diseases.

There are several ways to help do this:

- **Feeding a good, nutritious ration.** Consult a feed dealer, nutritionist or veterinarian and test your feeds to create a ration that will keep cows healthy. *(See Nutrition section of this guide)*
- **Keeping housing clean and well-ventilated** to ensure cool and dry environments. Ensure that animals are kept comfortable at all ages and stages. *(See Housing and Equipment section of this guide)*
- **Mastitis control in the milking herd.** Ensure that you have proper milking procedures, use a teat dip after milking, milking equipment is clean and well maintained and a proper dry cow treatment program is followed.
- **Pay attention to calf health** to increase their growth rate and reduce disease-related losses. When animals start out healthy, it's easier to maintain.
- **Building immunity to diseases** through vaccination protocols and healthy immune systems.

Remember the old saying...

'An ounce of prevention is worth a pound of cure.'

In other words, keeping an animal healthy is cheaper and easier than nursing a sick animal back to health.

BUILDING IMMUNITY TO INFECTIOUS DISEASES

Immunity is protection from infectious diseases. It's like a shield that blocks out germs. Animals with immunity can fight off diseases before they get sick, just like you! That's why you get vaccinated for measles and mumps, because then you have immunity, or protection, from them!

Young heifers get immunity from colostrum when they are calves. This protection wears off by the time the heifers are about two months old. To give their immune systems a "boost" farmers vaccinate heifers. Usually if vaccinations are given before heifers are six months old, they don't have enough protection to fight off diseases as they age. Therefore, they must be vaccinated again (a booster shot).

Vaccinations come in many forms, including injections, nose sprays, and pills.

Shots, shots, shots

Before vaccinating your heifers, you should always talk to your veterinarian. Depending on where you live, your herd might not need to be vaccinated for certain diseases. For example, Ontario was declared buncellosis-free in 1985. This means that good vaccination programs helped to get rid of the disease. Veterinarians can also tell you what the best vaccine is for your animals and how to administer it. Most of the time vaccinations need to be given annually. Maintain good health records so you know when to vaccinate again. The table on the next page shows a few common infectious diseases that animals can be vaccinated against.

Killed vaccine versus modified live vaccine

You should always know what type of vaccine you're giving your heifer. Killed virus is exactly as it sounds. The virus in the vaccine has been killed and doesn't multiply in the blood. Modified live viruses act like the actual disease, multiplying in the body. The cow's body fights back and develops antibodies (germ fighters) to combat the disease.

Diseases Cattle Can Be Vaccinated Against

Disease	Mode of Transmission	Symptoms	Prevention
<p>Bovine Viral Diarrhea (BVD)</p>	<p>Body fluids, dam to fetus.</p>	<p>Abortions, malformed or weak calves, diarrhea, fever, drop in milk production, respiratory disease.</p>	<p>Get carriers out of the herd and vaccinate heifers before breeding to protect the fetus.</p> <p>Vaccinate with killed vaccine 7-8 weeks before breeding and 3-4 weeks after the first shot. Give a booster shot each year, OR vaccinate with modified live vaccine 3-4 weeks before breeding, then give a booster each year.</p>
<p>Infectious Bovine Rhinotracheitis (IBR) (ry-no-tray-kee-eye-tis)</p>	<p>Viral disease common in fall/winter when animals are moved indoors.</p> <p>Saliva, nasal discharges.</p> <p>Often spread by cattle that appear healthy but carry the virus.</p>	<p>Abortion, brain and genital infections, pneumonia and inflamed eyes, red and crusty nose, harsh dry cough, diarrhea in calves.</p>	<p>Vaccinate at 6 months of age (if using a killed vaccine repeat the shots after 3-4 weeks).</p> <p>Vaccinate again 7-8 weeks before breeding, then annually.</p> <p>Vaccinations are available that are injected either into the muscle or up the nose.</p> <p>Animals usually recover in 10-14 days if no complications set in.</p>
<p>Rabies</p>	<p>Infected animal biting another animal (i.e. cows can get it from raccoons or foxes)</p>	<p>Behavioural changes, trouble swallowing and a distinct type of bellowing call.</p>	<p>Vaccination of all animals, once 1 year.</p>

Disease	Mode of Transmission	Symptoms	Prevention
<p>Leptospirosis</p>	<p>A zoonotic disease caused by bacteria, which is transferred from animals to humans, primarily through the animal's urine infecting a human water source.</p> <p>Infected animals, mud, water, vegetation and urine.</p>	<p>Cattle: abortions, often with retained placentas; drop in milk production; clotted, thick reddish milk but no signs of udder swelling.</p> <p>Calves: severe illness with jaundice (yellow skin); reddish to dark brown urine.</p>	<p>Yearly vaccination of breeding cattle in problem areas.</p>
<p>Blackleg (a form of myotitis, a muscle disease)</p>	<p>Bacteria in soil produces toxic gas that becomes trapped in the muscle causing pain, swelling and loss of function. Animals become infected when they eat the toxic soil.</p>	<p>High fever, lameness, swelling in the heifer's body, and death within 12-48 hours</p>	<p>Vaccination of all cattle under two years of age.</p> <p>There is no treatment for the disease once animals are infected.</p>
<p>Bovine Respiratory Disease Complex (BRDC)</p> <p>aka Shipping Fever Pneumonia</p>	<p>Caused by both bacterial infection and stress. Stress may be due to weaning, shipping long distances, weather changes, castration, dehorning, etc.</p>	<p>Causes severe lung damage. Calves have difficulty breathing, do not eat, and may die if not treated.</p>	<p>Vaccine is available.</p> <p>Prevention lies in keeping stresses to a minimum.</p> <p>Treatment with antibiotics is only successful if started early.</p>

INFECTIOUS DISEASES WITH NO VACCINES

Some infectious diseases do not have effective vaccination protocols but may affect cattle of all ages. A few common ones are listed below:

Meningitis - This often develops in association with a viral or bacterial disease, or due to a head injury. It is an inflammation of the membranes that cover the brain and spinal cord. To treat this disease, the animal must remain in a quiet area away from other animals, and be under the care of a veterinarian. It can be prevented by promptly treating bacterial infections.

Bovine Leukosis (BL) - Leukosis is caused by the bovine leukosis virus (BLV). 30-70% of carriers of the disease have an increased number of white blood cells; tumours form in about 5% of infected animals. The disease evolves very slowly, and may take months or years to progress. The clinical form is called enzootic bovine leukosis, and the tumours it causes are called adult bovine lymphosarcoma or benign lymphocytosis. There is no known cure.

Symptoms: When cows develop lymphosarcoma, they are subject to weight loss, weakness, bloat, and decreased milk production. Enlarged lymph nodes can be felt in the neck, behind the udder and in front of the shoulder. Other signs include congestive heart failure and paralysis.

Cause: The disease is spread by infected animals during contact from one animal to another, from mother to fetus in the womb, from mother to calf via her milk. For one animal to pass it to another, there needs to be a transfer of blood. This could happen by animal contact with lesions or sharing needles and syringes, examination gloves, dehorning instruments, tattooing, ear tagging equipment, surgical instruments, or other tools that could become contaminated with infected blood.

Prevention: Prevention of spreading the disease includes culling infected animals, ensuring that management tools are kept clean and sterilized after use, and testing animals to determine which ones are carriers of BL. Canwest DHI (Dairy Herd Improvement) now has a milk test that producers can use to test milk to determine if cows are leukosis carriers. Traditional laboratory testing can also be done to determine which cows have the disease, so that those animals can be managed or culled accordingly.

Listeriosis (Circling Disease) - A bacterial infection that causes abscesses of the brainstem, and abortion. Signs may look like rabies. Infection is spread by urine, milk, feces and contaminated tissue, it can also be found in feed. Keep diseased animals away from other animals and dispose of aborted fetuses immediately.

Lumpy Jaw (form of osteomyelitis) - A bacteria, *Actinomycesbovis*, causes the jaw bone to swell and sometimes ooze a yellow discharge. Antibiotics or intravenous iodine are used as treatment methods. If antibiotics are unsuccessful, the animal is sent to market for salvage.

PREVENTING NON-INFECTIOUS DISEASES

You cannot vaccinate against any non-infectious diseases. Many of these diseases can still be prevented by good farm management and an effective herd health program.

Subclinical and Clinical Diseases

In addition to being either infectious or non-infectious, diseases can be categorized as subclinical or clinical:

Subclinical – No obvious outward signs that an animal is sick. For example, parasites are usually subclinical because a cow can have them for a long time without showing signs externally.

Clinical – Symptoms of the illness are outwardly evident that the animal is sick. Examples of clinical diseases are calf scours and pneumonia.

Keeping Cattle Healthy – *At all ages and stages!*

Just like people change throughout their lifetime, so do cows. At different ages animals have special needs to ensure that they are kept healthy.

Healthy cattle have little STRESS

Cattle of all ages are healthier if they are kept in a good environment and fed properly. Reducing sources of animal stress will help to ensure that animals of all ages are more resistant to diseases.

There are many forms of stress:

- Environmental Stress
 - Humidity
 - Drafts
 - Dust
 - Manure gases (hydrogen sulphide, carbon dioxide, carbon monoxide, methane gas, and ammonia)
 - Temperature changes
 - Airborne bacteria, viruses, fungi, etc.
- Behavioural Stress
 - Overcrowding
 - Mixing animals from different sources
- Nutritional Stress
 - Imbalance or deficiency of nutrients
- Production Stress
 - Heavy production

Did you know?

About 75% of all calf losses are in the first two weeks of the calf's life on the farm. **Sours** is the most common cause of death in calves.

Any combination of these stresses can suppress an animal's immune system. If an animal is exposed to a disease-causing agent (bacteria, virus) at a time when its immune system is not able to function at its best, it is likely to be infected with the disease and become very sick. Its body may take longer fighting the disease, meaning that the animal takes longer to recover. Keep stress to a minimum!!

Off to a Good Start – Keeping Calves Healthy

Preventing calves from getting sick is very important. It means fewer vet bills and less time spent caring for sick calves. It also means that calves spend more time and energy growing than they do fighting germs.

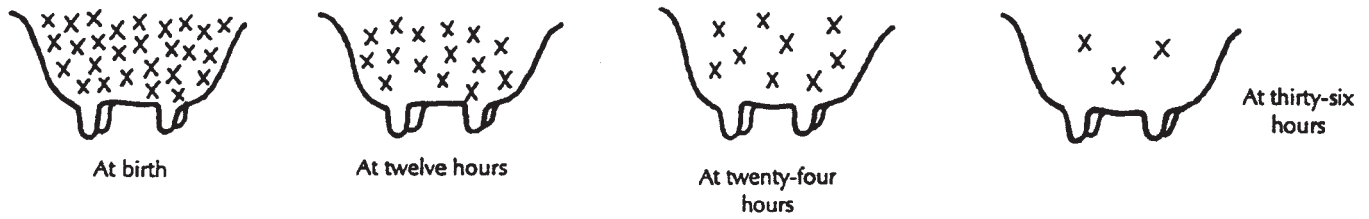
There are 6 main management tips to help you control and prevent calf diseases:

1. Remove the source of the disease.
2. Remove the calf from the contaminated environment.
3. Feed the calf colostrum.
4. Vaccinate the calf.
5. Reduce stress.
6. Find a high-quality caregiver.

The procedures below will help make sure that the six management strategies listed above are met:

- **Vaccinate the cow** for *E. coli* and Rotavirus scours and/or other diseases (as advised by your veterinarian) before she calves. Her body will then build disease fighting antibodies that will be passed on to the fetus inside her.
- **Clean calving place** - a calf must be born in a clean place. A newly bedded maternity pen and a shady, grassy area away from other cows are both good places to be born.
 - Make sure that manure does not come into contact with a calf's nose.
 - Bedding should provide disease control, comfort and footing.
 - There should be 4 to 6 inches of bedding in the calving area.
 - Within half an hour of birth, calves should be removed from the calving area and moved to an area for calves only, where no other dairy animals are being housed.
 - Remove soiled bedding and add fresh straw or shavings after each calving.
- **Keep cows clean** – Cows and their udders should be clean and free from manure so that the cow is not a source of infection for her calf.
- **Navels** – Keep navels from becoming infected. Examine navels for swelling and reaction to pain at feeding time until the calf is two weeks old and the umbilical area has healed.
- **Keep calf housing clean and dry** – Don't let germs and dampness find a home in your calf housing. Make sure the pens or hutches are always dry and freshly bedded. Clean old pens with disinfectant to kill germs that could be spread to the next calf.
- **Don't crowd your calves** – When calves are crowded, it is easier for germs to travel. Calves need at least 1.2m x 2.4m of space each.

- **Feed calves well** – Don't overfeed calves or give them bad feed. Also, keep the feeding pails and other equipment clean. Giving your calf a dirty bottle is like you eating, off of a dirty plate!
- **Be a good caregiver** - Remember to be patient with young calves and be alert to changes in their behaviour. You have to be willing to put in the extra time calves need to thrive.
- **Feed colostrum** – Feed calves 4 litres (3 litres to small breeds) of high quality colostrum within 30 minutes of birth. Colostrum gives a calf important antibodies to help her fight disease, BUT the calf's body can only absorb these antibodies for a short period of time, with the most antibodies being absorbed during the first two hours of her life. After 24 hours, she gets no antibodies from colostrum.



More Colostrum Cautions

- Wash your hands to get rid of germs before collecting colostrum from the cow.
- In order to keep the colostrum clean and the cow's udder healthy, prepare the cow's udder just as you would for milking.
- Collect colostrum from the mother within 15 minutes of calving, if possible.
- Disinfect calf bottles and nipples.
- If the colostrum from the new mother is of poor quality, feed the calf good quality colostrum that has been frozen, or a high quality replacement product.
- Feed the calf another 2 litres of colostrum (or high quality replacement) within 8 hours of birth.
- For three days, feed calves 3 litres of colostrum two times daily at 12 hour intervals and then switch the calf over to normal milk or milk replacer.
- Do not feed milk from treated cows as it could contain drug or infectious residues.

There are several things that can result in poor quality colostrum:

- The cow was dry less than three or four weeks.
- The cow was milked or leaked milk before calving.
- The cow's udder and teats were not cleaned before milking.
- The cow is new to the herd and hasn't built up antibodies against diseases in the herd.
- The cow has mastitis or another illness.

Changing concentration of antibodies in colostrum

Dehorning and Removing Extra Teats

Two other activities should be part of your calf health program – **dehorning** and **removing extra teats**.

Dehorning

Cows should be dehorned so that they're safer to handle and less likely to cause injuries to other animals or themselves, dehorning also prevents the early wear-out from rubbing. You should dehorn a calf when she's young because she has less horn tissue than when she is older. This reduces the chance of pain and infection.

The two most common methods of dehorning young calves are chemical and electrical dehorning. Chemical dehorning involves putting a caustic chemical onto the surface of the horn when the calf is less than two weeks old. Electric dehorning involves using a hot iron on calves under three months of age. The hot iron takes 15 to 20 seconds to kill the horn cells at the base of the horn. You may consider using a local anaesthetic with either method. If horns are removed at an older age, they must be cut off close to the base of the horn, which is more traumatic for the animal. If the horn cells are not killed or the horn is not cut close enough to the base, the horn will re-grow.

Removing extra teats

Extra teats may eventually interfere with milking. Remove them when the calf is one to two months old. Before removing the extra teats, make sure that the teat you're cutting off isn't going to be a milk producing one. To determine which is which, consult a vet, who can then remove the extra teats.

COMMON CALF DISEASES

Calves commonly become sick due to calf scours (diarrhea), pneumonia or parasites. Both calf scours and pneumonia are clinical diseases so there are obvious signs that a calf is suffering from disease. Parasites are often subclinical so a calf may have them before you can tell she is infected.

Calf Scours

This is a disorder of the digestive tract, caused by infectious or non-infectious sources. Symptoms typically include thin, watery, and sometimes bloody manure. Non-infectious scours are caused by poor nutrition resulting from poor-quality feed, a change in diet, unclean feeding equipment, or feeding too much milk. The most common and most serious type is infectious scours, which costs more money to treat and is more likely to result in death. Infectious scours are caused by germs and bacteria, such as:

- ***Escherichia coli (E. coli)*** - Affects calves up to one week old. It is very common and will kill a calf quickly.
- ***Salmonella*** - Affects calves between one and four weeks of age. Caused by contaminated feed and infected animals
- ***Rotavirus*** - Affects calves between one and two weeks of age. Causes mild to moderate scours and the calf will usually get better.
- ***Coronavirus*** - More likely to kill calves. Infects calves from two days to three weeks of age. The virus causes watery scours and the calf dehydrates quickly.

Treatment for calf scours is done by following several steps:

- Separate the sick calf so no other calves will become infected.
- Replace lost fluids with electrolytes. Electrolytes are minerals that the calf's body needs to replace the water her body is losing. You can buy electrolyte solutions from your veterinarian or feed supplier.
- Give milk and electrolytes in alternate feedings – milk, then electrolytes, then milk, and so on...
- With the help of your vet, figure out the cause of the scours. Use this knowledge to prevent future outbreaks.

Pneumonia

Pneumonia is a lung infection. Its symptoms include a hacking cough, rapid breathing, and sometimes a fever or refusal to eat. While it sounds like the flu that people get, calf pneumonia can kill an infected animal in 3 or 4 days if she is not properly looked after.

Enzootic Pneumonia (en-zu-aht-ik nu-mo-nee-ah) is the most common type of infectious pneumonia and can occur in calves up to six months of age when they are housed in a damp, drafty environment.

Pneumonia is caused by germs from calves and older cattle. Since adult cattle are often carriers, moving calves to a calf barn or hutches immediately after birth offers some protection. Calves that are weak due to poor feed, wet and drafty housing, or another illness are more likely to get pneumonia. Also, if the calf didn't get enough colostrum at the right time she will be more susceptible to pneumonia. Enzootic pneumonia damages the lungs, allowing bacteria to get in. The calf gets much sicker, goes off feed, coughs more and grows very poorly.

The best prevention is a clean and dry environment that is free from drafts.

Treatment involves keeping sick calves away from healthy ones in separate stalls or pens that are dry and well-ventilated. They also need antibiotics, so consult your veterinarian. Keep track of the calf's temperature to see if she's getting better or worse. Finally, figure out what's causing the pneumonia, especially if there are several sick calves. Once you know the cause, you can work to prevent further outbreaks.

Parasites

A parasite is a tiny bug that lives off of another animal. The parasite uses its host animal as a source of food to create more parasites. In severe cases, the parasite makes the animal sick, or causes clinical signs of disease in the animal; however there are usually no obvious signs of parasites (subclinical), other than the animal just doesn't grow as well as expected. Here are some examples of parasites that are common in calves, heifers and cows:

- **Coccidia/Coccidiosis** (also known as bloody scours) - This parasite usually affects calves older than four weeks of age, and while it is more common in younger animals, older heifers and cows may be affected as well. Animals that eat infected bedding or manure can get the disease. The parasites that cause the disease are protozoa called coccidia, and they enter the body through the food and water supply. When they reach the intestines in large enough numbers they invade the walls. The walls thicken and can no longer digest and absorb food properly. Inflammation and pinpoint bleeding of the mucus membrane occurs. The larger the number of coccidia present, the more severe the infection.

Symptoms - Bloody diarrhea, anemia, weight loss, general weakness, severe straining accompanies excretion, stringy feces that is full of mucus, delirium and nervous twitching (appears near the end of fatal attacks). Animals that do not die in the first two weeks of the illness can be expected to recover.

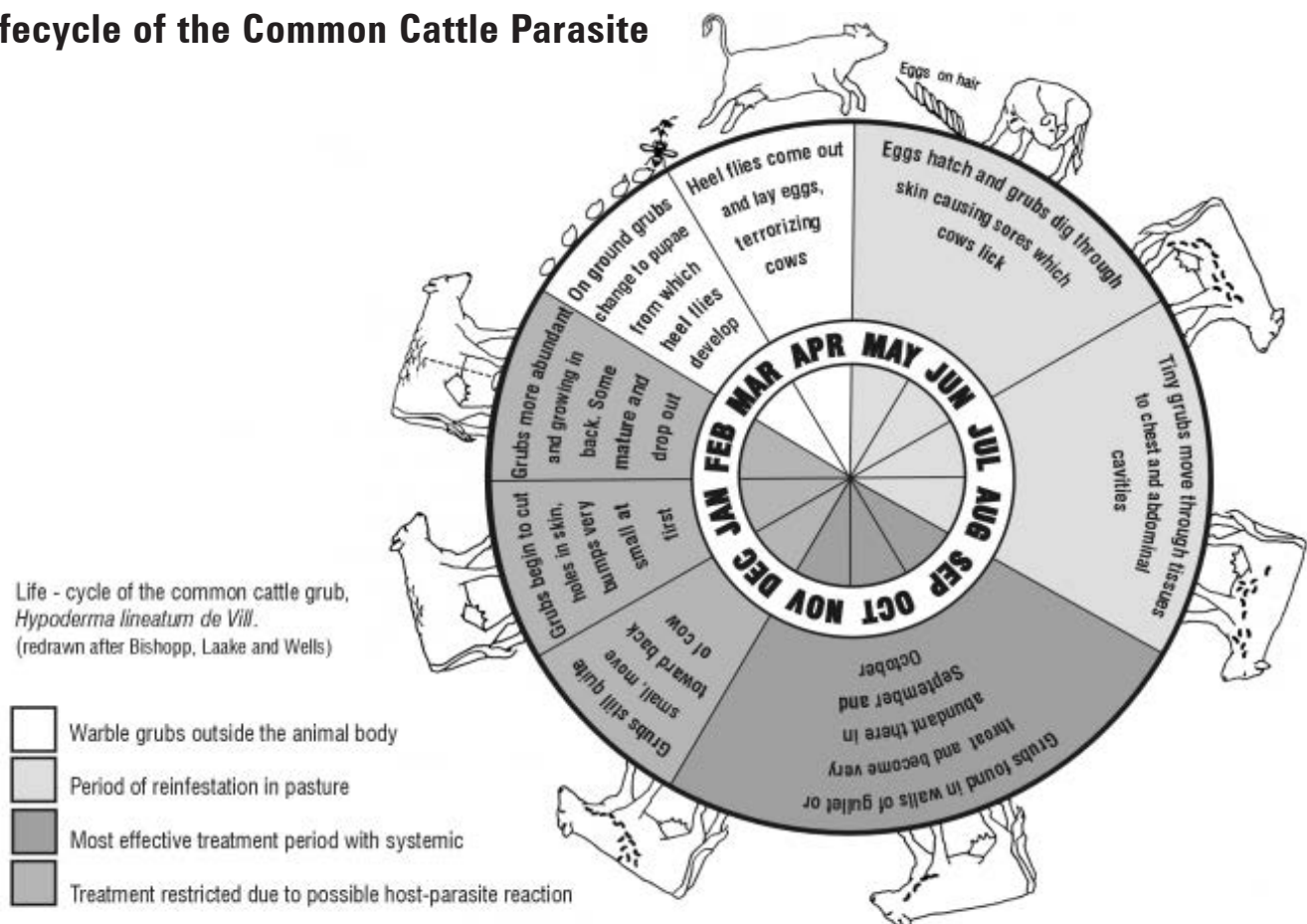
Treatment - Treatment to control the diarrhea should be initiated. Commercial preparations are available to help restore the electrolyte (sodium and chloride) balance lost during the disease in the animal. Consult your veterinarian.

Prevention - Cleanliness is very important in preventing the disease, as this keeps down the number of coccidia parasites in the environment. Ensure that the animals have sanitary living conditions and are not overcrowded. Watch for signs of infection after the stresses of weaning, shipping and sudden changes of feed. Proper animal management should be practiced to ensure that such conditions do not occur.

- **Crypto Sporidium** - This parasite causes scours in two to three week old calves. After four weeks, the calf becomes immune to the parasite. Infected calves clear up in five to ten days.
- **Lice** - These are external parasites. They live on the hides of calves and heifers of all ages and can be treated using a topical pesticide.
- **Warbles** - A small fly larva that causes inflammation around the spinal cord. Cattle eventually become uncoordinated and eventually cannot get up. Treatment occurs by administering an insecticide before December 1 (see chart on the next page) so that the larva is killed before it has the opportunity to migrate to the spinal cord.

Treatment depends on the parasite. If the parasite causes scours, you need to treat the scours first. Drugs are also available in injectable, pour-on and feed-added forms to control other parasites such as worms and lice. The best approach to parasites is to prevent them by keeping calf areas and feed clean. Check manure samples for coccidiosis and worms. Also, some calf starters contain medicine to prevent coccidiosis.

Lifecycle of the Common Cattle Parasite



KEEPING HEIFERS AND DRY COWS HEALTHY

Healthy heifers and dry cows means that they will have healthy calves and start milking well. Aspects of managing heifer and dry cow health include:

- Properly vaccinating for the right diseases at the right time.
- Paying close attention to nutrition, especially close to calving.
- Housing in a dry, well-ventilated environment.
- Keeping area clean and dry.
- Effective dry cow treatment.

Drying off Cows - The Healthy Way

On a dairy farm, “drying off” means drying up a cow’s udder so that she stops giving milk. The cow’s cycle of giving milk is called lactation. The lactation starts when a cow has a calf and ends when the cow is dried off. The cow must be dried off before she calves again. She should be dried off no less than 40 days before her next lactation to give her udder a chance to rest and her body a chance to use more of its energy for her growing fetus.

To dry a cow off, give her less feed and water for three or four days to help lower her milk production and help her body get ready to stop giving milk. Then, stop milking her and give her dry cow therapy. Dry cow therapy is an antibiotic treatment that helps prevent mastitis, both during the dry period and during her next lactation. Since mastitis is the most common disease affecting milk quality and quantity in the dairy industry, preventing it is very important. Dry cows have the biggest risk of contracting mastitis in the first three weeks after drying off when the udder is collapsing, and the last two weeks before calving when the udder is swelling and starting to produce milk in preparation for calving. Dry cows are easier to treat than milking ones because there is no lost milk production during this medicated period. There are also additional treatments available that seal the teats to further prevent infection, especially as the cow gets closer to calving.

It is recommended that you blanket dry cow treat your herd, which means that all animals are given the therapy. The treatments are injected into the udder via the teat canal and are meant to be long-lasting. This means that you need to keep careful records of when cows are treated. These records help prevent accidents, like putting a cow’s milk into the bulk tank before the dry cow medication has completely left her body. Accidents like this are most likely to happen if the cow has a very short dry period because she is dried off too close to her due date, or because she gives birth to a premature calf.

Heifer and Dry Cow Nutritional Disorders

There are some non-infectious diseases that are directly related to nutrition in the dry period before they calve. Milk fever and ketosis are two such diseases, and have been identified as common diseases affecting profitability.

Procedure for administering a dry cow treatment:

1. Milk the udder out completely.
2. Immediately following teat cup removal, dip all teats in an effective teat dip.
3. Allow the teat dip to dry, then clean excess dip from teat ends with a clean, single-service paper towel.
4. Starting with the teats on the far side of the udder, disinfect the teat ends by scrubbing each for a few seconds with a separate, alcohol-soaked, cotton swab.
5. Starting with the teats on the close side of the udder, insert the cannula (needle) only six millimetres into the teat end. Then, inject each quarter with a single dose syringe of the recommended treatment. Massage the treatment up into each quarter. Single dose syringes are recommended for dry cow therapy rather than bulk containers because bulk containers may become contaminated with antibiotic-resistant organisms and become a source of infection.
6. Immediately following treatment, dip all teats in an effective teat dip.
7. When practical, teat dip all treated cows at least once a day for two weeks after drying off and for two weeks before calving.

Udder edema, another problem affecting cows at calving time, is outlined below.

Udder Edema - This is swelling in the udder that is caused by too much sodium or potassium, or a lack of Vitamin E, which makes the udder fill with fluids. It increases chances of udder infection and damage to the udder that causes udder breakdown.

Treatment - Normal cases of edema are treated by rubbing the cow's udder gently with a suitable oil or cream, which promotes blood flow and soothes the udder. Severe cases can be treated with medications as prescribed by your veterinarian.

Prevention - Limit the salt (sodium) fed to dry cows and heifers to 30-40 grams per day. Balance the ration for Vitamin E and limit grain to heifers to a maximum of 4kg per day before calving. Avoid feeding forages high in potassium during the last few weeks before calving.

KEEPING COWS HEALTHY

Making sure that milk cows don't get sick prevents milk production losses, veterinary bills, wear and tear on the cows, and stress on the farmer. If you stop diseases such as mastitis before they happen, your cows will feel better and milk more.

When it comes to facilities, dairy farms focus on four key areas to keep their cows healthy (these areas are important to calves and heifers as well):

1. New Farm Animals
2. Farm Visitors
3. Housing
4. Cleanliness

New Farm Animals

New cows, often purchased from sales and other farms, can bring diseases to your farm. There are several ways that you can keep new cows from getting other animals sick on your farm:

- **Isolate new cows** - Isolating cows means keeping them apart from the rest of the herd. House, feed and calve new animals in separate areas from the rest of the herd. Animals should be isolated for 21-30 days. Watch any new animal and test her for diseases.
- **Know where the new cow came from** - You can buy cattle from herds that are free from diseases. Examples are those that are tested to be Johne's Free and Leukosis Free herds that are certified as CHAH (Canadian Health Accredited Herds). Know the health of the animal you are buying. Transfer cows to your farm in your own truck. Avoid purchasing animals from sale barns where diseases can freely and easily be passed from cow to cow.
- **Use lab tests** - You can take blood and milk samples from new animals and allow them to enter your herd only after their tests come back negative for the disease in question.
- **Use vaccinations** - Vaccines protect animals from getting sick. Ask your vet what vaccines the new animals should have. Prior vaccinations will also help prevent existing animals in the herd from contracting diseases from the new animal.

Farm Visitors

Visitors to your farm can bring diseases with them. Visitors are not just people, but also cars, trucks, and wild animals.

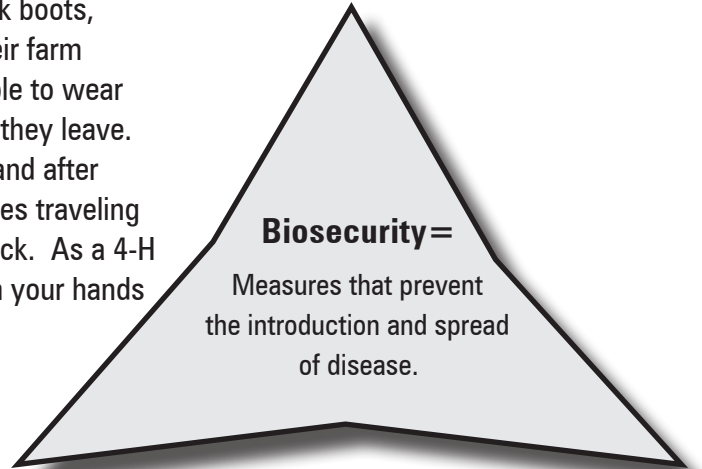
- **Birds** – Birds can spread diseases. To control them, try to keep them out of your barns and feed storage by putting up screens. You should also cover areas that would make good nests.
- **Rodents** – Rats and mice carry diseases. They also destroy feed and equipment. To control these pesky creatures, set traps, poison them, and 'rodent-proof' your buildings. Note that Alberta is officially a rat-free province.

Did you know...

One rat deposits 25,000 droppings in one year, and one mouse deposits 17,000 in one year. These droppings can mix with feed and spread diseases.

- **People** – People can spread diseases from their work boots, clothing, hands after treating sick cows and from their farm vehicles. Have a foot bath for boots and/or ask people to wear single use plastic boots that can be discarded when they leave. Ensure that people wash their hands before milking and after touching sick animals. Finally, make sure that vehicles traveling between farms are clean and stay away from livestock. As a 4-H member, remember to wear clean clothing and wash your hands before visiting a farm for a 4-H meeting.

For more information on farm visitors, see the Biosecurity information earlier in this section of the 4-H Member Project Guide.



Housing

For milk cows to have healthy housing, you must:

- Give cows their own rooms by keeping different age groups apart.
- Give them SPACE! Each animal needs to eat and move around freely. Crowded animals get sick easily.
- Focus on cow comfort.

For more information on milk cow housing, refer to Housing and Equipment section of the 4-H Dairy Member Project Guide.

Cleanliness

Keeping your farm clean helps to keep your herd healthy and prevent the spread of disease. In addition to keeping your farm neat and tidy, with walkways swept and clean, you should:

- **Get rid of dead animals** - Dead animals are unhealthy for people and animals. Bury them within two days, under at least 0.6m of soil, or call a deadstock service to take the animal away quickly.
- **Control flies and manure** - Many diseases are spread through manure, urine and flies; thus, you need good manure and fly control systems. Manure removal will also help reduce fly populations.
- **Use disinfectants** - Disinfectants are cleaning products with a “kick”. The cleaner has germ killer. Find a disinfectant by reading its label. Use disinfectants especially in maternity pens, calf pens, foot baths and on equipment.

CANADIAN NATIONAL HEALTH PROJECT

In 2007, the Canadian National Health Project was launched by several Canadian dairy industry partners, including the Canadian Dairy Network, Canadian Dairy Herd Improvement Partners, Breed Associations, AI Organizations, and Veterinarian Groups.

This project has several objectives that will benefit farmers:

- Create a national dairy health and disease database that can be used by dairy farmers and their veterinarians to develop herd health programs.
- Develop a national genetic evaluation system for all dairy breeds so that producers can use genetic selection to reduce the incidence of common diseases.
- Help the dairy industry meet the expectations of consumers who demand healthy milk products. Consumers not only want to know that milk is healthy and nutritious, but also that it came from a healthy cow who was raised in a good environment.

What diseases are included in the Project?

While the database will have the opportunity to include data on a wide variety of calf, heifer, and cow diseases, in the beginning the program is going to start with the eight most common diseases that are known to affect profitability in milk cows, as seen in the table below.

PRIMARY DISEASES FOR RECORDING IN CANADIAN DAIRY HERDS		
DISEASE	LACTATION INCIDENCE	ESTIMATED DISEASE COST
Clinical Mastitis	14.2%	\$360
Lameness	7.0%	\$315
Cystic Ovarian Disease	8.0%	\$137
Displaced Abomasum	1.7%	\$340
Ketosis	4.8%	\$450 (subclinical ketosis: \$236)
Metritis	10.1%	\$150
Milk Fever	6.5%	\$340
Retained Placenta	8.6%	\$285

Source: *Top 10 Questions about the National Health Project – Produced by Canadian Dairy Industry Partners, as adapted from Dr. David Kelton et al., Journal of Dairy Science, 1998.*

How will information be obtained?

Producers will be able to provide records of these diseases to their DHI field staff for input. The Canadian Quality Milk Program will be requiring that producers keep track of diseases, so providing information for this database will not be extra work for the farmer.

Creation of Genetic Evaluations for improved disease resistance

Once enough data has been collected, official bull proofs will begin to contain a disease related component for each of the eight core diseases. These proofs should be quite valuable as some of these diseases are known to be linked to heredity. Diseases with higher heritabilities mean that daughters are more likely to get the trait from their sire or dam than those with lower heritabilities.

HERITABILITY ESTIMATES FOR VARIOUS DISEASES IN DAIRY CATTLE	
Disease	Heritability
Clinical Mastitis	9%
Lameness	4%
Cystic Ovarian Disease	4%
Displaced Abomasum	14%
Ketosis	6%
Metritis	6%

Source: *Top 10 Questions about the National Health Project – Produced by Canadian Dairy Industry Partners as adapted from Dr. David Kelton et al., Journal of Dairy Science, 1998.*

Overview of Definitions for Diseases Identified by the Canadian National Health Project

- Mastitis** – Visually abnormal milk (ie.: clots, flakes or watery) from one or more quarters that may also include inflammation of the udder (ie. heat, swelling, discolouration) and systemic illness of the cow. *(For detailed information, see mastitis section on following pages.)*
- Lameness** – Abnormal gait attributed to either the foot or leg. *(For detailed information – see lameness section on following pages.)*
- Cystic Ovarian Disease** – In cows greater than 30 days in milk who are not yet pregnant, this disease is characterized by the presence of follicles greater than 25mm in diameter on one or both ovaries in the absence of a corpus luteum and uterine tone. *(For detailed information, see “Reproduction” section of 4-H Member Project Guide.)*
- Displaced Abomasum** – The cow has decreased appetite with an audible, high pitched ping produced by tapping the left abdominal wall between the 9th and 12th ribs for left displaced abomasums. *(For detailed information, see displaced abomasum section on following pages.)*
- Ketosis** – Depressed appetite with evidence of elevated milk, urine or breath ketones; diagnosed after exclusion of other clinical disease. *(For detailed information, see ketosis appropriate section on following pages.)*
- Metritis** – In a fresh cow up to 20 days in milk, the presence of an abnormally enlarged uterus containing watery red-brown fluid, signs of systemic illness or fever. Cows greater than 20 days in milk may also have the disease if they have an abnormal cervical or vaginal discharge unrelated to a heat. *(For detailed information, see Reproduction section of 4-H Member Project Guide.)*
- Milk Fever** – Cows within 72 hours before or after calving showing one of the stages of milk fever. *(For detailed information, see milk fever section on following pages.)*
- Retained Placenta** – Failure to eliminate afterbirth within 24 hours of calving. *(For detailed information, see Breeding and Reproduction section of 4-H Member Project Guide.)*

MASTITIS

It is very important for dairy farms to focus on mastitis prevention and treatment since it is the number one cause of decreased milk quantity and quality from dairy farms.

Mastitis is an udder infection. Bacteria enters the udder through the teat end and subsequently infects the udder. Often, the cow can fight the infection by herself. In this case, there are no visible signs of mastitis, just a drop in milk production. This is called “subclinical” mastitis.

If the bacteria gets the upper hand and grows rapidly, the result is swelling, pain and hardness in the udder. The cow’s milk can be lumpy, watery, stringy or flaky. This is called “clinical” mastitis.

Mastitis infections can destroy milk secreting cells. The cow will not get the milk-producing ability back from those cells. So, mastitis lowers milk production while the cow is infected, and can have a permanent affect on milk production. It’s kind of like a bruise that never heals.

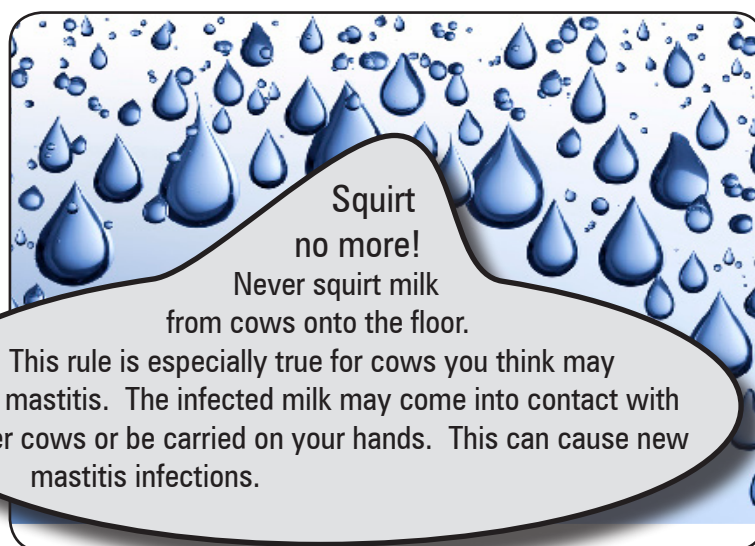
Methods of Testing for Mastitis

There are a few ways to test for mastitis. The chart comparing environmental and contagious mastitis tells you what methods work best for different types of infections:

- **Examine the udder** - Feel the udder to see if it’s swollen, painful to the cow, or feels warm. Squirt a small amount of milk from the quarters into a strip cup to see if the milk is lumpy, flaky or watery.
- **Use the California Mastitis Test (CMT)** - A CMT is a quick, easy way to test for a high somatic cell

count, a sign that a cow is trying to fight an infection. Squirt some milk from the quarters (or the quarter you think is infected) into the four sections of the paddle (the paddle has four sections so you can keep the milk from the four quarters separate). Then, squirt a little bit of purple CMT solution into the milk. Swirl the mixture around in the paddle, allowing the CMT solution and milk to mix. If the cow is infected, the milk has more somatic cells than normal and the mixture will thicken to a gel and/or have whitish clumps in it. The higher the somatic cell count, the more the milk thickens into a gel. Normal milk will remain the same consistency, turning purple because of the solution.

- **Culture the milk** - By sending a milk sample to the lab, you can find out exactly what type of organism is infecting the cow, and whether it’s contagious or environmental.
- **Test Somatic Cell Counts (SCC)** - Somatic cell counts are a cow’s response to an infection. When the cow’s SCC is higher than normal it may mean that she has an udder infection.



Somatic Cells Counts (SCC)

Somatic cells are white blood cells. These cells can destroy bacteria, prevent or get rid of infections, and repair damaged tissue. If a cow has a high SCC, then her somatic cells are working overtime to get rid of an infection. SCCs are good management tools. Your cows can be tested for SCCs when they are tested for milk production. From these tests, you can spot cows that have mastitis infections.

Generally, SCC results are a good indication of contagious mastitis. Environmental mastitis tends to last only a few days and the chances of missing a high SCC are high compared to contagious mastitis.

What do high SCCs mean for your herd's milk production? The table below shows milk production losses for varying herd somatic cell counts:

SOMATIC CELL COUNT	PRODUCTION LOSS PER HERD (%)
100,000	0
200,000	.8
300,000	2.3
400,000	3.8
500,000	5.3

Adapted from: "Economics of mastitis control worksheet" by The Upjohn Company.

Treatment of Mastitis

Even with a good prevention program, some cows will still get mastitis. Sometimes, a cow will fight environmental mastitis on her own, with a comfortable place and supportive therapy. Milking the cow may often be enough to remove toxins produced by the bacteria. Another option for contagious mastitis, or more severe cases of environmental mastitis, is to infuse or inject antibiotics directly up the teat canal of the cow's infected quarter.

The steps to follow to treat with antibiotics are:

1. Milk the udder out completely.
2. Rub the teat end with an alcohol swab to disinfect it.
3. Warm the mastitis medicine to body temperature and shake well.
4. Infuse the right dose into the teat canal using a single-dose, individual, disposable syringe. Don't insert the needle too far. About 6mm is far enough or you can damage the teat.
5. Massage the udder to move the medicine into it.
6. Dip all the teats with an approved teat dip.

Mastitis 101

There are two forms of mastitis, **contagious** and **environmental**. The table below compares the differences between the two types of mastitis:

CHARACTERISTIC	CONTAGIOUS	ENVIRONMENTAL
Source of new infections	<ul style="list-style-type: none"> Bacteria on skin or udder. Source is always other infected cows. 	<ul style="list-style-type: none"> Bacteria in bedding, manure or mud. Source is the environment.
How infection spreads	<ul style="list-style-type: none"> Contact with machine and milker's hands and wash cloths that have been in contact with an infected cow. 	<ul style="list-style-type: none"> Contact with a dirty environment. Milking wet udders.
Most common organisms	<ul style="list-style-type: none"> Streptococcus agalactiae. Staphylococcus aureus. 	<ul style="list-style-type: none"> Coliform (i.e. <i>E.coli</i>). Streptococcus nonagalactiae.
Infection Dynamics	<ul style="list-style-type: none"> Usually persistent subclinical infection with repeated clinical flare ups. Seldom cured without antibiotics. 	<ul style="list-style-type: none"> Infection is less persistent, usually starts with a clinical case. Often cured by the cow without antibiotic therapy.
Somatic Cell Count of infected cows	<ul style="list-style-type: none"> Always high but quite variable. 	<ul style="list-style-type: none"> Highly variable.
Clinical symptoms	<ul style="list-style-type: none"> Swelling and abnormal milk with: <ul style="list-style-type: none"> No fever – Streptococcus agalactiae. Mild to moderate fever – Staphylococcus aureus. 	<ul style="list-style-type: none"> Swelling and abnormal milk with: <ul style="list-style-type: none"> No fever to moderate fever - Streptococcus Nonagalactiae. More severe fever and off-feed cows - Coliform.
Detection (you can never be sure from the symptoms, only a culture can correctly identify the organism)	<ul style="list-style-type: none"> Somatic Cell Count, California Mastitis Test, Culture. Clinical signs are less helpful because many cases are subclinical. 	<ul style="list-style-type: none"> Clinical signs, culture. Somatic Cell Count and California Mastitis Test are less helpful because most infections start with a clinical case.
Treatment	<ul style="list-style-type: none"> Follow veterinary advice. Use antibiotics at dry off. Use antibiotic in lactation (Streptococcus agalactiae and clinical Staphylococcus aureus). Staphylococcus infections are very difficult to cure and may result in culling the cow. 	<ul style="list-style-type: none"> Follow veterinary advice. Strip the quarter frequently throughout the day and night. Treat systemic symptoms.
Prevention	<ul style="list-style-type: none"> Teat dipping. Good milking hygiene and technique. Stress free living – reduce flies that bother cattle, prevent teat injuries, increase cow comfort. Dry cow treatment. 	<ul style="list-style-type: none"> Clean, comfortable stalls, fresh bedding. Good milking hygiene and technique (sanitary, use teat dip, proper equipment). Stress free living – reduce flies that bother cattle, prevent teat injuries, increase cow comfort. Dry cow treatment.

Source: Adapted from Jack Rodenburg, OMAFRA Dairy Specialist, 1997

LAMENESS

Those Aching Feet!

There are numerous diseases and infections that cows can pick up on the farm, one of the most common ailments for dairy cattle today is lameness. The average number of cows suffering from feet injuries are higher than before, which is due to the fact that more and more cows walk longer days on cement flooring, genetics have made cows more fragile, and higher production is expected. All these factors combined create stress on the cow, which leaves her more susceptible to foot problems.

Lameness may be assessed using the scorecard below:

SCORE		DESCRIPTION	ASSESSMENT CRITERIA
NON-LAME	1	Normal	Walks rapidly and confidently, making long strides with a level back.
	2	Mildly Lamé	Walks more slowly, making shorter strides with an arched back. Stands with a level back and does not appear to favour a limb
LAME	3	Moderately Lamé	Walks slowly, making deliberate short steps with an arched back; may favour a limb. Stands with an arched back and frequently lifts affected foot. Cow discomfort when standing and long periods of resting. Visible signs of swelling and pain.
	4	Severely Lamé	Moves slowly, making frequent stops to rest affected limb. Only partially weight bearing. Stands and walks with a pronounced arched back.

Source: Canadian National Health Project 'Dairy Cattle Health Definitions'

Causes of Lameness

A number of factors may cause lameness, including stressful environments, poor nutrition, and poor conformation.

Stressful Environments - Slatted floors, slippery free-stall housing and abrasive surfaces such as stones, stubble or frozen ground all put stress on an animal's feet and legs. Warm, wet housing breeds diseases such as foot rot.

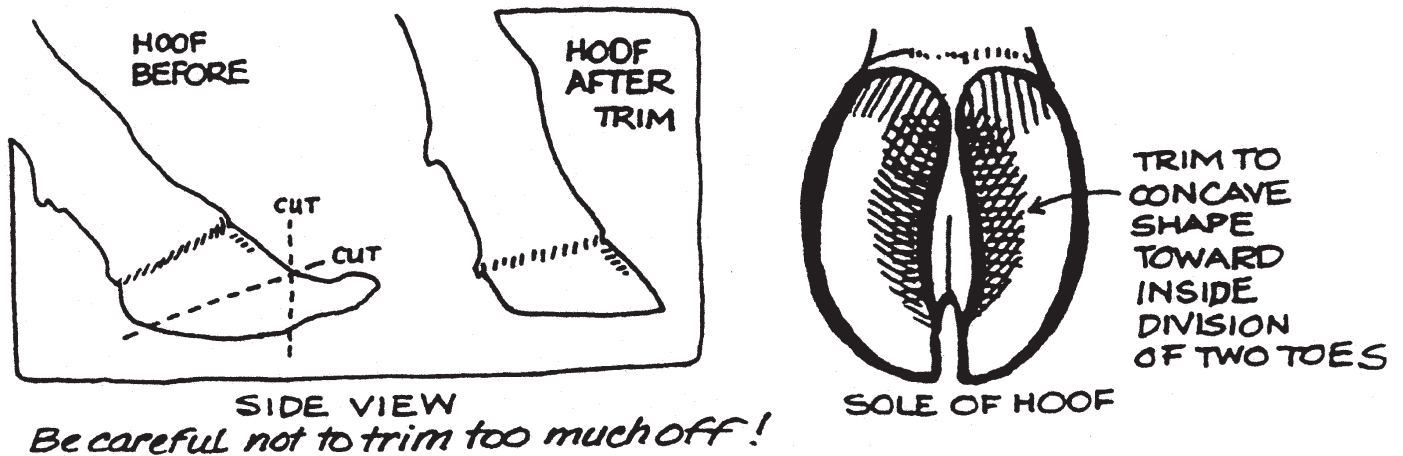
Poor Nutrition - Feeding too much high energy feed or a sudden change in diet leads to acidosis, a ruminant disease. Acidosis in turn causes laminitis, a crippling hoof condition. Once a cow gets laminitis, her feet will never develop properly again. Lameness can also be caused by a lack of calcium, phosphorus, magnesium, manganese, zinc and Vitamin E, or an excess of calcium and fluorine, and a lack or excess of Vitamin D.

Poor Foot Conformation - Cattle born with bad feet, abnormally straight hocks, sickle hocks, cow hocks, weak pasterns, flexed pasterns, overlapping toes, or soft hooves are more susceptible to lameness.

Prevention

There are several management techniques on the farm that can help to reduce lameness:

- Breed cows to bulls with better conformation scores for feet and legs.
- Follow proper nutrition guidelines, feeding balanced rations.
- Allow cows to stand on well-drained dirt and grass. The grass cleans their feet and the dirt keeps away organisms.
- Groove slippery concrete floors and smooth concrete that is too rough. Slippery concrete doesn't naturally wear down a cow's feet and it makes her tend to walk on her heels, giving her overgrown toes. Rough concrete injures a cow's feet.
- Install a foot bath. Foot baths remove irritants, harden the hoof and prevent infections. In parlours, install the bath so the cows walk through it as they leave. The foot bath solution should be selected based on the foot problems in the herd.
- Keep free stalls clean, dry and comfortable. Cows that lay down rest their feet and let them dry.
- Trim feet at regular intervals. Many farmers hire a professional hoof trimmer to do this. When animals live in soft well bedded areas, their hooves grow too long and they can't stand properly.



HOOF DISEASES

DISORDER	CAUSE	EFFECT	TREATMENT/ RECOVERY
Foot Rot (interdigital dermatitis)	<ul style="list-style-type: none"> Bacteria-<i>Fusiformis Necrophorus</i> Small stones, frozen ground, mud, urine, and manure. 	<ul style="list-style-type: none"> Lameness, swelling, and inflammation of the skin of the coronary band and the skin between the claws. It is painful. There is an odour released resembling sour milk. The hoof may ooze a white or grey puss. 	<ul style="list-style-type: none"> Keep cattle on paved surfaces; keep them as dry as possible. Have cattle walk through copper sulphate foot baths. Treat with injectable antibiotics and local treatment of the foot lesions. If treated right away a full recovery is possible.
Strawberry Foot Rot (digital dermatitis)	<ul style="list-style-type: none"> Bacteria – <i>Dermatophilis congolensis</i> Contact with infected animals or equipment, may be dormant in soil; high temperatures, humidity and wet environments cause outbreaks. 	<ul style="list-style-type: none"> Appears as a reddened patch just above the cleft of the hoof. The lesion will develop into a raised patch that has pointy projections with hair-like structures sticking out. This is very painful and causes lameness. 	<ul style="list-style-type: none"> This is hard to clear up. Footbaths, topical dressings and antibiotic sprays; usually cleaning and spraying for 7 or 8 days will start the healing process.
Club Foot	<ul style="list-style-type: none"> Can be hereditary. Can be a result of foot rot. 	<ul style="list-style-type: none"> The toe forms an angle of more than sixty degrees to the ground. Soon the wall of the toe is about twice as high as that of the cow's heels. 	<ul style="list-style-type: none"> If it is hereditary you may want to consider culling that bloodline. Otherwise, do not overwork the animal. Get a hoof specialist to look at the animal.
Brittle Hoof (Cracked Hoof)	<ul style="list-style-type: none"> The condition is often hereditary. Occurs when animals that have their hooves in wet areas for a long time and then are transferred to the constant dryness of stable bedding. Also caused by excessive wound dressing. 	<ul style="list-style-type: none"> The horn of the animal suffers from an abnormally dry state. May appear as being baked hard and stony. The hoof may start cracking. 	<ul style="list-style-type: none"> Have a balance of wet and dry areas. Make sure that the animals feet are tended to regularly.

Source: Adapted from 4-H Ontario Veterinary Manual

DISPLACED ABOMASUM (D.A.) OR TWISTED STOMACH

This is a common problem in dairy cattle. Its specific causes are unknown, although ketosis, a high grain or silage diet or other sudden changes in diet are thought to be involved. Ketosis is an accumulation in the blood of ketone bodies produced when fatty acids are broken down. The abomasum loses muscle activity, slows down and becomes full of fluid and gas. As gas accumulates, the distended abomasum acts like a balloon. When this happens, the abomasum either moves up and to the left, or up and forward. In severe cases, abomasal torsion or twisting can occur.

Symptoms - Going off feed, decreased milk production, dehydration, and reduction in manure passage. When twisting happens: pain, kicks at stomach, gets up and down frequently, rapid dehydration, over 100 heart beats per minute, shock. Twisted stomachs can be detected by tapping the body wall of the cow near her stomach and listening with a stethoscope between the 9th and 12th ribs (left D.A.). Normally, the cow's stomach region will sound hollow, or you may hear some rumination noises. When a cow has a displaced stomach, the tapping will sound like pinging a tin can.

Treatment - Treatment can vary from doing nothing to shipping the animal for slaughter. Putting the cow on a grass hay diet and removing any grain or silage will sometimes make a difference and the cow's stomach may return to its normal configuration. In some cases, rolling a cow over, with the help of someone experienced, will be enough to move her abomasum back into place. In more severe cases, surgery may be required to fix the abomasum to the abdominal wall to prevent further movement. In cases of twisting, surgery may only be partly successful, and it may be necessary for the cow to be destroyed. Consult your veterinarian.

Prevention - When a cow goes off feed, remove silage and grain, and do not reintroduce these foods until the cow has returned to normal feeding. If metritis or ketosis is also suspected these conditions should be treated. Once an animal has already suffered an episode of displaced abomasum it may be necessary to surgically tie the stomach in place to prevent subsequent displacements.

MILK FEVER

Milk fever occurs when the cow has a sudden need for calcium at calving when milk production begins. The cow's blood calcium level drops. This causes the cow to weaken, go down and possibly die.

Symptoms – Within 72 hours before or after calving, sick cows will show signs of one of the following stages of milk fever. ***Each stage indicates an increasing level of severity of the disease:***

Treatment – Administering calcium by oral, subcutaneous or intravenous injection is usually sufficient to treat the disease. Especially in more serious cases, the effects of intravenous injection are realized more quickly, enabling the cow to recover more quickly. However, administering calcium intravenously must be done very slowly. Putting too much calcium into the cow's bloodstream at once will cause her heart beat to become more rapid and could result in a heart attack. Listening to the heart beat with a stethoscope while administering calcium intravenously is a good idea.

Prevention - Feeding a proper ration to the cow two weeks prior to calving teaches her body to get extra calcium from her bones when needed.

Stage 1: Mild excitement or stiffness, weakness or weight shifting, increased rectal temperature (above 39°C).

Stage 2: Lies down and cannot get up, cold extremities, decreased rectal temperature (less than 38°C).

Stage 3: Cow lies on side with legs stretched out, pulse difficult to detect.

KETOSIS

This is caused by chemical changes in the cow's body in the month that she has a calf. The disorder occurs when a cow doesn't eat enough to keep up with her own milk production, creating a negative energy balance (or negative nutritional balance).

Symptoms - Decreased milk production, general poor health, possible liver damage, more susceptible to *E. coli* mastitis.

Treatment - Drench the cow with glycol and administer sugar (dextrose) intravenously to increase energy levels. Injections of vitamins will help to maintain healthy blood cells.

Prevention - Change the feeding program just before drying off to ensure proper body conditioning. Change it again just before calving, this can increase a dry cow's appetite. Then, she eats more of the energy she needs to produce milk. The fresh cow ration should also be high in energy. Good feeding will help the cow switch to high energy feed after she calves. This helps to prevent the negative nutritional balance that results in ketosis. In addition to nutritional prevention, ketosis can also be prevented by calving in a clean, dry and comfortable location that is not crowded.

DIGESTIVE DISORDERS

There are several disorders that can affect the digestive systems of dairy cattle. Rations should be designed to minimize problems, but there are several complications that can occur. Note that displaced abomasums are a digestive disease but are discussed in previous sections with the other main diseases affecting dairy cattle.

Stomatitis

Inflammation of the mouth caused by bruising or chemical irritation.

Symptoms - Excessive salivation, evident pain in the mouth, bad breath.

Treatment - Often, you simply need to remove the cause of irritation, such as a plant lying in the barn. Antibiotics may sometimes be used.

Prevention - Keep animals away from pastures with sharp plants or grasses. Buttercups, crocus, and cowslips can cause chemical damage, as can medicines containing arsenics, mercurials and iodides. Such medicines should not be applied to skin where the animal might lick them. Do not give animals hot foods.

Choke

Occurs when foreign objects clog the esophagus.

Symptoms - Coughing, retching, slobbering, forced swallowing, may appear anxious, bloated.

Treatment - It may be possible to work the object up with your hand by feeling through the throat. Lower objects may be gently pushed into the stomach with a probing (rubber tube with wooden plug at one end).

Prevention - Do not feed large pieces of food to animals. Keep foreign objects that can be swallowed away from animals.

Abscess of the Liver

Caused by a disorder of the rumen resulting from heavy grain feeding. It could be the result of parasitism or an infection from the gut.

Symptoms - Usually no visual signs.

Treatment - Determine and treat the primary disorder that is resulting in the liver abscess.

Prevention - Conditions usually indicate some other disease and prevention lies in treating the primary disorder.

Bloat

Occurs when the rumen and reticulum become filled with gases. It often results from eating lush pasture when the rumen overloads with gas that cannot escape. The gas mixes with food to form foam - frothy bloat.

Symptoms - This is a serious condition that can result in death within hours. It begins with pronounced swelling in left flank. In severe cases, the upper part of the flank rises above the level of the backbone. The animal moves uneasily and has difficulty breathing.

Treatment - WORK FAST! Release the gas as quickly as possible. Pass a stomach tube into the rumen until the gas pocket is reached. If much froth is present it means gas has mixed with the food and won't be easily released.

Pass a pint of defoaming agent such as vegetable oil through the tube. If it won't go down the stomach tube, inject it into the paunch with a syringe and extra long needle.

As a last resort, the rumen can be punctured with a knife or trocar (pointed instrument with a tube that stays in the loin to allow gas to escape). This is called tapping and should be done by someone experienced. A cow should be tapped halfway between the last rib and the point of the hip bone and four inches down from the side of the vertebrae to the short ribs.

Prevention - Gradually introduce animals to lush legume pastures and never let them overeat on that type of feed. Feed high grain diets carefully. Commercial anti-foaming agents can be added to the feed concentrate to guard against frothy bloat.

Gastric Impaction or Indigestion

Indigestion occurs when the first two compartments of the stomach are packed with food that won't digest. In rare cases, the third, and even fourth, compartments are overfilled. Improper feeding, bad feeds or gorging are usually the causes.

Symptoms - Going off feed, stops chewing cud, constipation, moaning, arches her back and kicks at her belly; in severe cases, the animal may go down and become paralyzed as if in a stupor.

Treatment - If bloat accompanies indigestion, treat bloat first. Animals often recover suddenly without treatment. The animal should not be put back on feed until the rumen has again become active. In very severe cases, it may be necessary to operate to remove the undigested food.

Prevention - As with bloat, overeating of grain or green foods should be avoided. Sudden changes from pasture feeding to dry feeds are also dangerous as they can lead to impaction.

Johne's Disease (yo-nees)

This disease is becoming a big cause for concern on dairy farms due to losses in milk production. The disease is spread via the manure of infected animals and gets into the food and water supply. When the organism arrives in the intestines, it attacks the walls and sets up an infection that causes food to no longer be absorbed into the blood. Though young animals are usually attacked, death may not follow until years after the infection has set in.

Symptoms - General loss of conditioning in the animal, diarrhea, rough coat, dry skin, loss of appetite (appears towards the end of the disease).

Treatment - There is no known cure. Practically all animals die within one month to two years after symptoms appear; therefore, the best treatment is prevention.

Prevention - Prevention is aimed at halting the spread of the disease. It is especially important to protect young animals since they are most susceptible to infection. Good sanitation to reduce the exposure of animals to the manure of infected cattle is essential. When introducing new animals to the herd, they can be tested for the disease. CanWest DHI is now offering optional tests from production milk samples to determine whether cattle are carriers of Johne's. Infected animals should be culled from the herd to prevent further losses from those infected animals, and also to prevent further spread of the disease within the herd.

Hardware Disease

Occurs when foreign objects such as nails, wire or machinery parts are eaten. They are swallowed into the rumen where they often do little or no harm. However, once pushed into the smaller reticulum, they puncture the wall and from there can damage the diaphragm, liver, heart or lungs. Most heavy metal objects will probably fall directly into the reticulum.

Symptoms - Going off feed, weakness, showing obvious pain when moving, may stand with her back feet lower than its front to relieve pressure on the abdomen.

Treatment - Surgery may be required to remove the object. Antibiotics should be used to control infection. Never give laxatives to an animal suspected of having hardware disease.

There is a special magnet made in the shape of a bolus that can be given to the animal. The animal eats it and it remains in the reticulum to collect and immobilize any magnetic material. The magnet can remain in the stomach of the cow for the rest of her life and will not cause her harm.

Prevention - The most logical preventive measure is to keep metal objects out of reach of cattle. Cow magnets are also practical and inexpensive tools to help prevent ingested objects from moving through the system.

DISEASES MAKING HEADLINES...

As the public becomes more concerned about food safety and the welfare of animals raised as food, outbreaks of animal diseases have become popular news items in recent years. For farmers, such outbreaks confirm the need for biosecurity measures on the farm to ensure that their animals don't get sick.

Two diseases that have reaffirmed the importance of effective biosecurity in recent years are Foot and Mouth Disease (FMD) and Bovine Spongiform Encephalitis.

Foot and Mouth Disease (FMD)

- Is a highly contagious, viral disease.
- In 2001 an outbreak resulted in the slaughtering of 4,190,000 sheep, cattle, pigs, goats, and deer.
- It affects cloven-hoofed animals including cattle, sheep, pigs, goats, deer, elk, and buffalo; very rarely does it affect humans.
- Infected animals may develop blisters in the mouth (snout), on the feet, in the teat and udder.
- Most commonly spread by direct contact between animals, but FMD can be spread by indirect contact.
 - Direct: blisters, nasal discharge, saliva, milk, semen, manure, and urine.
 - Indirect: contaminated vehicles, people, frozen semen, contaminated feed, and drinking water.

KEEPING FMD OUT!

Vaccines exist, but only to protect animals for a short period of time. They would only be used in an emergency. Instead we must use what we have learned about bio-security to protect Canadian farms from FMD.

What should I do?

- **Control traffic!**
 - Do not allow visitors onto your farm who have been in a country affected by FMD in the last 14 days.
 - Do not use semen or embryos imported from FMD-positive countries.
- **Isolate!**
 - Animals showing symptoms of FMD from the rest of the herd.
- **Separate!**
 - Young and old animals to prevent spreading.
- **Report any suspected cases of FMD to your veterinarian.**

What is Canada Doing?

Canada's strict border policy has kept the country free from FMD since 1952:

- Used farm equipment, all live ruminant animals (cows, sheep, etc) and their products cannot be imported into Canada from a country that has had an FMD outbreak.
- Travelers are educated about the spread of the disease and are advised not to visit Canadian farms within 14 days of being in a country with FMD.
- Disinfectant is provided for travelers' shoes.
- Beagles are used to "sniff out" food products carried by travelers.

Bovine Spongiform Encephalopathy (BSE)

(Mad Cow Disease, Bovine TSE (transmissible spongiform encephalopathy))

- Caused by an abnormal prion protein that can convert normal prion proteins to abnormal ones; however, the specific cause of this protein occurrence is unknown
- It is a disease that attacks the nervous system of cattle, slowly progresses and is eventually fatal.
- BSE is a reportable disease in Canada, so veterinarians and laboratories are required to report it when they find an animal that has the disease. Canada's first reported case of BSE occurred in May 2003, with a handful of cases being reported after that. The presence of this disease resulted in the United States closing its borders to Canadian cattle from May 2003 to November 2007. Since the two countries are major trading partners, this caused great economic devastation to the Canadian agriculture industry.
- Infection results from eating infected brain or spinal cord material of an infected animal.
- Symptoms of the disease usually are not evident for four or five years. When they do progress, symptoms may include nervous or aggressive behaviour, abnormal posture, lack of coordination, trouble getting up, an increased appetite but lost weight, and decreased milk production. Usually the animal dies within two to six months after the onset of symptoms.
- Diagnosis may tentatively be made based on symptoms, but the only way to ensure an accurate diagnosis is to examine the animal's brain after it dies.
- There is no known vaccine or treatment for the disease. The best way to dispose of infected animals is incineration so that the disease cannot be passed on via the animal's carcass.

Did you know?

Canadian regulations strive to protect animals and food from BSE and other diseases. Since 1997, there has been a ban in Canada from feeding rendered protein products from ruminant animals to other ruminants. This ban, coupled with mandatory animal identification, required reporting of the presence of the disease, and controlling imported products are aimed at ensuring a safe food supply from healthy animals. In addition, before meat from animals is used for human consumption, the SRM (specified risk material) such as the brain and spinal cord is removed from slaughtered animals.

COMMONLY USED ANTIBIOTICS IN LACTATING DAIRY COWS

	Route	Milk Withdrawal (hours)	Meat Withdrawal (days)	Dose (mL /100 lbs or mL/45 kg)	Example mL per 1500 lbs cow	Indication
Penicillin	IM	96	10	3	45	Metritis, foot rot, wound infections
Tetracycline	IM / IV	72	18	3	45	Pneumonia, mastitis, metritis, foot rot, navel ill, calf diphtheria
Trivetin	IM / IV	96	10	3	45	Pneumonia, mastitis, metritis, foot rot
Excenel RTU	IM / SQ	0	3	1	15	Pneumonia, foot rot
Excenel RTU	IM / SQ	0	3	2	30	Metritis
Excenel Sterile Powder	IM	0	0	1	15	Pneumonia, foot rot

This information is required as part of CQM (Canadian Quality Milk) certification.

Note: The use of Excenel RTU for the treatment of metritis is a new label claim made in the fall of 2007.

For all injections, the maximum volume per site should not exceed 15 mL.

Injections in the Muscle (IM) use 1 - 1 1/2 inch needles 16 or 18 gauge.

Injections Under the Skin (SQ) use 3/4 - 1 inch needles 16 or 18 gauge.

Source: Ferguson Veterinary Services newsletter, 2007.

USING MEDICINE ON THE DAIRY FARM

While the most important way to maintain herd health is to manage your farm to prevent diseases, it is impossible to prevent your cows from ever getting sick. Medicines used to treat animals on the farm must be handled carefully - just like medicine for people! In fact, there are several reasons why medicines might be used on farms:

- Prevent and treat disease
- Promote or enhance growth
- Control parasites
- Enhance breeding
- Milk letdown

You cannot treat diseases properly unless you know how to store and use medicines safely. For example, some medications need to be stored in the refrigerator and would be useless if kept in a warm barn.

To ensure that medication is administered safely on farms, you may want to research courses at a local community college to see if any offer a livestock medicine course.

Purchasing Medication

There are three ways to obtain medication on the dairy farm:

1. Veterinarian - Sells over-the-counter drugs, as well as prescription drugs.
2. Livestock Medicine Outlets - Companies that are approved to sell over-the-counter medicines only.
3. Feed Dealers - Some medications may be provided in feed rations, with prescriptions required from your veterinarian.

NEVER purchase medication off the back of a truck or from your neighbour - this is illegal!

Storing Medication

Medicines should be stored according to the directions on their labels. Labels include expiration dates as well as the temperature at which the drug should be stored. If those two factors are not considered, you may be risking the effectiveness of the drug.

Medication should be stored in a closed cupboard or area that is not accessible to animals, children, or people other than those providing treatments.

TECHNIQUES FOR ADMINISTERING MEDICINE

There are several ways that medication can be administered to animals. Reading the label on the medication will tell you how it should be given to the animal.

Giving Pills (i.e. aspirin, scour pills, etc.)

Steps involved:

1. Tie the animal in a stall or secure in a head gate. Grab the animal by the side of its mouth and turn its head to open its jaws. Don't raise the head too high or the calf/cow won't be able to swallow.
2. Force the balling gun containing a pill or capsule into the side of the mouth, over the back of the tongue and far enough so that the cow can't cough up the pill. Push the plunger on the balling gun so the pill goes into the cow's throat.



Drenching (i.e. glycol)

Drenching involves trying to give a cow a liquid drug.

The steps to do this are:

1. Tie up the animal with its head to the stall or head gate so that its nose forms a straight line with its neck. Don't raise the head too high or the cow won't be able to swallow.
2. Give the animal a small amount of the liquid. The animal must swallow so that the liquid does not enter the lungs and cause more problems. It may be helpful to use a milker inflation over a pop bottle to get the liquid down far enough into the throat so that the cow can't spit it out. A plastic bottle is better than a glass one because it won't break. If the animal starts to cough, lower its head at once so that the liquid doesn't get into her lungs.
3. Continue to give the liquid in small amounts, allowing the animal time to swallow and breathe.

Paste Medications

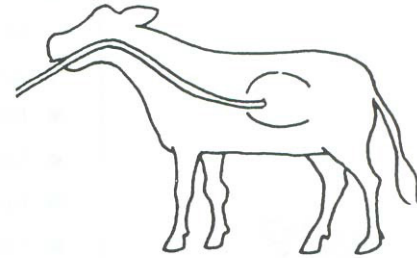
Pastes can be administered using a large disposable syringe.

1. Restrain the animal in a stall or headgate.
2. Place the tip of the syringe between the cow's lips at the corner of the mouth. Eject the paste well onto the back of the cow's tongue so that she can't spit it back out.



Stomach Tubing

Stomach tubes are sometimes used to deliver large quantities of liquid medications or nutrients into the stomach of the cow. They are often used to give electrolyte solutions to sick calves. It can also be used to relieve pressure from gas when a cow has bloat.



For calves, an esophageal feeder can be used for this purpose. For older animals a portion of a garden hose may be used. Stomach tubing should only be performed by people who are familiar with the procedure, as it is important to insert the liquid into the esophagus and not to get liquid into the lungs.

Giving a Needle

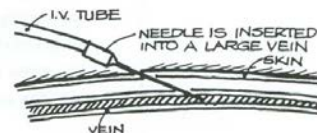
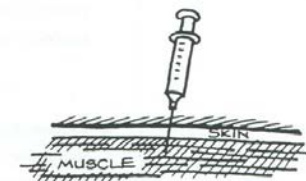
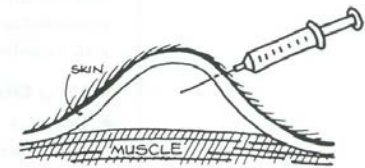
Needling is a very common way to treat an animal. There are three ways to administer medications via a needle:

1. Subcutaneous
2. Intramuscular
3. Intravenous

Subcutaneous injection (SC, Sub-Q) - Given under the skin. Insert the needle into the loose tented skin in the neck at front of the shoulder. Do not inject more than 10mL per site.

Intramuscular (IM) - Into the muscle. To reduce scar tissue or abscesses in meat, give IM injections into the neck, ahead of the shoulder point. Do not inject more than 10mL per site.

Intravenous (IV) - An IV injection is made into the vein on some area of the animal. IVs are most often given in the neck, but sometimes may be given in a vein under the tail or into the mammary vein. These injections are more difficult to give and should not be attempted by someone who isn't experienced. The medication must be administered very slowly and any air bubbles must be removed.



There are several steps to giving a needle:

1. Ensure that needles and syringes are clean and sterile. Needles should be disposable. Choose the right needle size:

Size of Animal	Route	Gauge	Length
Calf	Intramuscular	16-18	1 inch
Cow	Intramuscular	16-18	1.5 inch
Cow	Subcutaneous	16-18	½ - ¾ inch

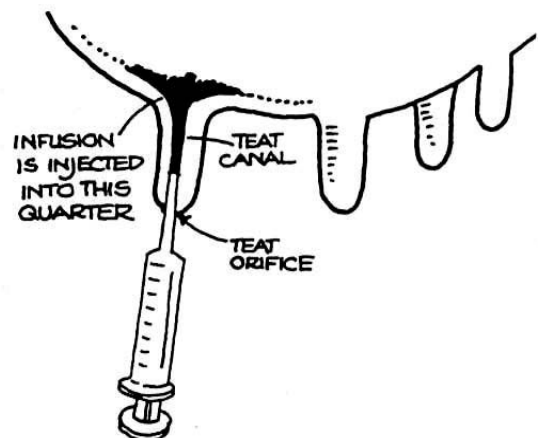
The size of needle may also depend on the substance. More watery drugs can be administered with smaller needles than more viscous ones can.

2. Tie up the animal or secure in a head gate
3. Shake the drug if the directions call for it. Disinfect the stopper. Hold the drug bottle upside down and push the needle through the rubber stopper. Inject some air into the drug bottle. Pull out the plunger until the syringe is filled to the correct level. Remove the drug bottle and hold the syringe upright. Force the air out of the syringe.
4. Disinfect a clean area on the animal where the injection is to be made. Choose different injection sites if needling the animal over a long period of time or when dividing doses. Intramuscular needling should be done in the neck, not the hindquarters, to avoid bruising meat and tissue.
5. Insert the needle and make the injection. You can pull back on the needle to check for blood to ensure that a subcutaneous or intramuscular injection is not going to go into a blood vessel. Conversely, you should pull back on the needle if making an intravenous injection to ensure that the injection will be made into the blood vessel. An intramuscular injection may require a little rubbing after the needle is removed.

Intramammary Treatment (Udder infusion)

Udder infusions are very similar to giving other needles, but instead of piercing the animal, the cannula of the syringe is inserted in the teat opening of the cow.

When using a cannula to insert intramammary drugs, partial insertion is recommended to reduce the chance of forcing microorganisms into the teat cistern.



Disposal of Medications and Needles

Safe disposal of unwanted medicines and used needles is very important for several reasons:

- Prevent illness or injury resulting from handling.
- If needles are not disposed of properly, someone could use them for another purpose.
- Unwanted medicines could be used inappropriately by others or lead to antimicrobial resistant infections.
- Waste can enter water and impact the farm water supply, creeks, rivers, lakes, and municipal water supplies.

There are a few places that unwanted medicines and sharps can be disposed of:

- Municipal landfills - Some landfills will accept them and target them for special disposal.
- Veterinarian - Some vets will accept these wastes according to biosecurity protocols.
- Commercial disposal companies - Companies that provide free service for waste disposal in safe storage containers. They autoclave unwanted needles and incinerate medicines.

Medicinal wastes should never be disposed using the following methods:

- Long-term storage on the farm due to deterioration of containers and labels.
- Buried on the farm because they could pollute soil and water.
- Burn barrels because some medications can explode when heated.
- Manure piles because someone or something could get hurt. Deterioration of needles takes a long time.
- On public property, because this is pollution.
- In household garbage or recycling bins because this causes environmental contamination or can injure municipal workers or spread disease and because these substances are not recyclable.
- On other farms because this promotes irresponsible use of medicines in livestock.

VO-COW-BULARY

A Glossary of Health Terms

Antibodies	Blood proteins that are produced in response to toxins (antigens) and then work to counteract the foreign toxin. Plural is alveoli.
Biosecurity	Measures that prevent the introduction and spread of disease.
Clinical disease	Symptoms of the disease and that an animal is sick are outwardly evident.
Colostrum	The first milk that a cow gives after calving that has high levels of antibodies to help the calf build immunity to diseases.
Immunity	Protection from infectious diseases caused by antibodies in the body that fight the disease.
Infectious disease	Diseases that can be spread from one animal to another animal.
Inhibitors	Substances other than bacterial culture that do not occur naturally in milk and inhibit the growth of bacteria (drug residues in milk).
Intramuscular	Into the muscle, as in an injection.
Intravenous (IV)	An IV injection is one made directly into the bloodstream of an animal.
Negative Energy	When a cow's body is using up more energy than it is consuming in its feed, body fat reserves are used to obtain necessary energy.
Non-infectious disease	Diseases that cannot be spread from one animal to another.
Parasite	An organism that lives in or on another animal and benefits (housing/food) at the expense of its host.
Respiration Rate	Number of breaths in one minute.
Somatic Cells	Somatic cells are white blood cells that destroy bacteria, fight infection and repair damaged tissue in the udder.
Subclinical disease	An animal is sick but has no obvious outward signs of her illness.
Subcutaneous	Under the skin.
Trocar	Pointed instrument with a tube that stays in the loin when inserted to allow gas to escape from the rumen; a procedure used as treatment for bloat.
Vital signs	Clinical measurements that indicate the state of essential body functions.
Zoonotic disease	A disease that can be passed between humans and animals.

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RELATED ACTIVITIES (SEE LEADER'S GUIDE)

Internet Activities	General All ages	
Symptom Game	Health	All ages
Taking a Calf's Vital Signs	Health	All ages
Complete Calf Health Examination	Health	All ages
Designing a Calf Health Program	Health	Senior members
Mastitis Demonstration	Health	All ages
Culture Sample Demonstration	Health	All ages
Herd Health Analysis	Health	All ages
Using Medicine Safely	Health	All ages
Administering Needles Safely	Health	Senior members
Evaluating Health Problems	Health	Senior members
Body Condition Scoring	Health	All ages
Body Condition Scoring at Different Stages of Lactation	Health	All ages
Belching Demonstration	Health	All ages

NUTRITION

Ruminant and Monogastric Stomachs

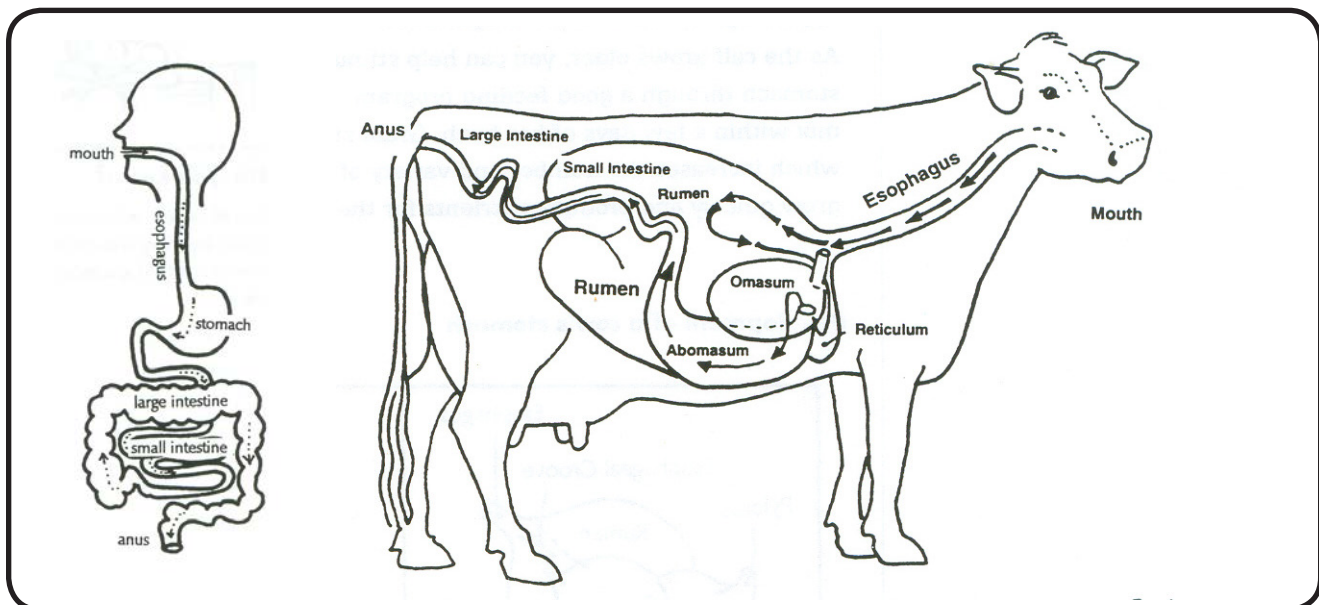
What did you have for supper last night? A couple of handfuls of grain? Some hay? Probably not. But the cows in the barn did.

Ruminant animals have complicated digestive systems. This means they not only need a special diet to stimulate digestion, but they also have unique health problems associated with their ruminant stomachs. A ruminant stomach has four chambers, each with its own job to help break up or digest food.

Humans have a monogastric stomach, monogastric means one stomach. In monogastric animals, all of the work involved in breaking up food is done in one stomach.

To understand the ruminant stomach, it is helpful to compare it to the monogastric stomach.

The diagrams below show cow and human digestive tracts:



Now, look at how ruminants compare to other animals:

<i>Digestive Compartment</i>	Volume of the total digestive tract				
	Ruminants		Monogastrics		
	<i>Cattle</i>	<i>Sheep</i>	<i>Horse</i>	<i>Pig</i>	<i>Human</i>
Total Stomach	70.8%	66.6%	8.6%	29.2%	18.8%
Small Intestine	18.5%	20.5%	30.2%	33.3%	62.4%
Cecum	2.8%	2.6%	15.6%	5.6%	0%
Large Intestine	7.9%	10.3%	45.3%	31.9%	18.8%
	356 kg	44 kg	211 kg	28 kg	6 kg

Source: Alberta 4-H Dairy Manual

From the comparison table, you will notice several things:

- The ruminant stomach takes up much more space than the monogastric stomach.
- The total capacity of ruminant stomachs is much larger than monogastric stomachs for animals of similar sizes.
- The large intestine takes up much more room in monogastrics than in ruminants.
- Did you notice any other differences?

THE DIGESTIVE TRAIL

The digestive system is also called the alimentary tract. It consists of all the parts of the cow's body that work together to digest food. Let's travel through the parts of a cow's digestive system:

STRUCTURE	COMPONENTS	FUNCTION	WHAT HAPPENS TO THE FOOD?
Mouth	<ul style="list-style-type: none"> Contains lips, teeth, a tongue, and salivary glands. 	<ul style="list-style-type: none"> Lips help bring the food into the mouth. Teeth begin mechanical digestion. The tongue helps mix and move the food towards the esophagus. Salivary glands provide juices containing enzymes that help in the chemical digestion of food. The epiglottis, a muscular flap, closes off the trachea and opens up the esophagus so that food can pass smoothly to the stomach. 	<ul style="list-style-type: none"> The teeth crush the food. Saliva wets the food and turns it into a soft mush; saliva contains enzymes that begin digestion of starch (a complex carbohydrate). Tongue turns the mush into a bolus.
Esophagus	<ul style="list-style-type: none"> Tube connecting mouth and stomach. The cardiac sphincter, a special ring of muscles, is located where the esophagus joins the stomach. 	<ul style="list-style-type: none"> The passage of chewed food from the mouth to the stomach. The cardiac sphincter is normally closed, preventing food and acid in the stomach from moving back up. A peristaltic contraction triggers it to open. 	<ul style="list-style-type: none"> No digestion occurs here.
Stomach	<p>The stomach has four chambers (discussed following this chart):</p> <ul style="list-style-type: none"> Rumen Reticulum Omasum Abomasum <p>The walls of the stomachs have three layers:</p> <ul style="list-style-type: none"> An inner MUCUS MEMBRANE, or lining, with glands that secrete important digestive juices. A thick middle MUSCLE LAYER that makes movement possible. An outer layer of CONNECTIVE TISSUE. 	<ul style="list-style-type: none"> First major digestive organ within the gut. The lining of the stomach secretes gastric juice, which is a mixture of mucus, the enzyme "pepsin" and hydrochloric acid (HCl). The mucus acts as a gel to provide a flexible protective coating to the stomach. Pepsin helps in the digestion of protein. HCl is what gives the stomach the acidic environment needed by the enzymes that work there. Separating the stomach from the intestine is the pyloric sphincter. Like the cardiac sphincter, it acts as a valve. It prevents food from moving back into the stomach, and lets food enter the intestine when opened. 	<ul style="list-style-type: none"> Powerful contractions churn the food, mixing it with the gastric juice. Proteins are partially digested here; fats and carbohydrates are not well digested. No nutrients are completely digested in the stomach. Therefore, the food must be sent onto the small intestine. By the time the stomach is finished, the food is a soft, warm, grey to brown mush called chyme.

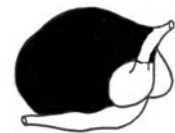
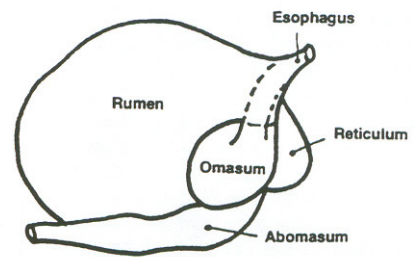
STRUCTURE	COMPONENTS	FUNCTION	WHAT HAPPENS TO THE FOOD?
<p>Small Intestines</p>	<ul style="list-style-type: none"> The small intestines are divided into three sections – the duodenum, the jejunum and the ileum. Duodenum: This is the first part of the small intestine. It occupies roughly 5% of the total intestinal length. It is tied to the stomach, and is formed in an S-shaped curve, which holds the pancreas. Ducts from the pancreas and the liver enter here. Jejunum: This central portion is the largest part of the small intestine, occupying 90% of its length. It is not clearly separated from either the duodenum or the ileum. Ileum: This last 5% is usually bunched up or contracted. It meets the large intestine at the ileo-cecal-valve, which prevents food from moving back up into the small intestines. 	<ul style="list-style-type: none"> The small intestine has two major functions: <ul style="list-style-type: none"> To complete the digestion of food To absorb nutrients Digestion occurs primarily in the duodenum and the jejunum. This is where intestinal juice mix with bile and pancreatic juice to provide the enzymes needed to finish the breakdown of food. Intestinal juice comes from the lining of the wall of the intestine. Unlike the stomach, which is acidic, the juices in the small intestine are alkaline. Absorption takes place once digestion is complete, in the final two thirds of the jejunum and in the ileum. The exception to this rule is animals whose cecum is enlarged and specialized, because this is where cellulose digestion and absorption occurs. The horse, rabbit and pig all have special cecums. The walls of the small intestine contain two important parts: glands, which secrete intestinal juices that aid in digestion; and villi. Villi are small finger-like projections in the lining of the intestine that greatly increase the villi's surface area. Due to the villi, nutrients are more easily and more quickly absorbed. The villi move constantly. This helps them come in contact with all the digested food so that it can be completely absorbed. 	<ul style="list-style-type: none"> As food leaves the stomach, it is a semi-fluid acidic mass known as chyme. Chyme is gradually released into the duodenum thanks to periodic openings of the pyloric sphincter. As soon as chyme enters the duodenum, it mixes with new secretions, and turns from an acidic to an alkaline mush. Once digestion is complete, the chyme becomes chyle, a milky material that contains all the nutrients from digestion. The nutrients are picked up by the villi that line the intestine, and ultimately make their way into the animal's bloodstream.

STRUCTURE	COMPONENTS	FUNCTION	WHAT HAPPENS TO THE FOOD?
<p>Large Intestines (Colon)</p>	<ul style="list-style-type: none"> The large intestine differs from the small in that it is larger, lumpier and has a more fixed position. It is divided into the cecum and the colon. 	<ul style="list-style-type: none"> No digestion and very little absorption take place in the large intestine. Its job is: <ul style="list-style-type: none"> To remove excess water from the non-absorbed foods, To concentrate non-absorbed foods into feces. The cecum is usually an off-shoot where the small and large intestine meet. In humans and carnivores the cecum is not much more than a holding tank for digested food that has had all of its nutrients removed. In non-ruminant herbivores and omnivores the cecum is more important. For example in the horse, it is a huge pocket 1.3 metres long in fact! Its capacity is greater than that of the stomach and its lining contains villi, glands and a mucus membrane. The colon is a reservoir for excrement. It empties into the rectum, which opens to the outside at the anus. The anus is controlled by two sphincters. In animals that have been trained, the external, voluntary sphincter allows feces to be held until it is convenient for voiding. 	<ul style="list-style-type: none"> Specialized cecums act like rumens. They have billions of micro-organisms that ferment and digest cellulose. Unlike rumens, little gas is produced.

A CLOSER LOOK AT THE FOUR STOMACH CHAMBERS

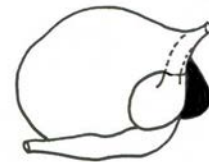
Rumen (paunch)

- The largest stomach in an adult cow, taking up 80% of the total stomach capacity, and holding up to 110kg of food.
- All the food goes here first. The food is mixed.
- The muscles in the rumen break down the food.
- Bugs (called microorganisms) are present in the rumen to break down the food and rebuild it into protein. The cow digests the bugs later and uses the protein made by the bugs for herself. When you feed a cow, you are really feeding the rumen bugs!



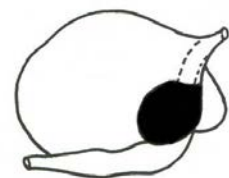
Reticulum (honeycomb)

- The second stop for partially digested food is the reticulum.
- It has honeycomb-shaped compartments all over it. The honeycomb catches wire, nails and other foreign materials.
- Food is mixed, soaked in acidic juices and broken down further
- Food that's too large is regurgitated back to the mouth to be rechewed as cud, or bolus.



Omasum (books)

- The third stop on the digestive trail is the omasum.
- Food is broken down further.
- Many 'leaves', like the pages in a book, make up the omasum.
- The omasum squeezes the food between the leaves to get rid of water and move the material to the last compartment.



Abomasum (true stomach)

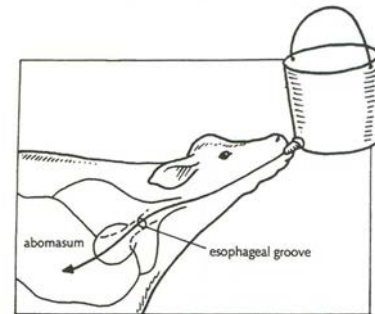
- Finally, the food stops in the last chamber of the stomach – the abomasum.
- The abomasum is similar to a human stomach.
- This is the only stomach that works in a young calf and the milk she drinks goes directly here.
- Secretes stomach juices and acids that break down food materials into simple nutrients (proteins, carbohydrates, fats, etc.).
- The cow's body will absorb these nutrients to give her energy and help her grow. Most absorption takes place later, in the intestines.



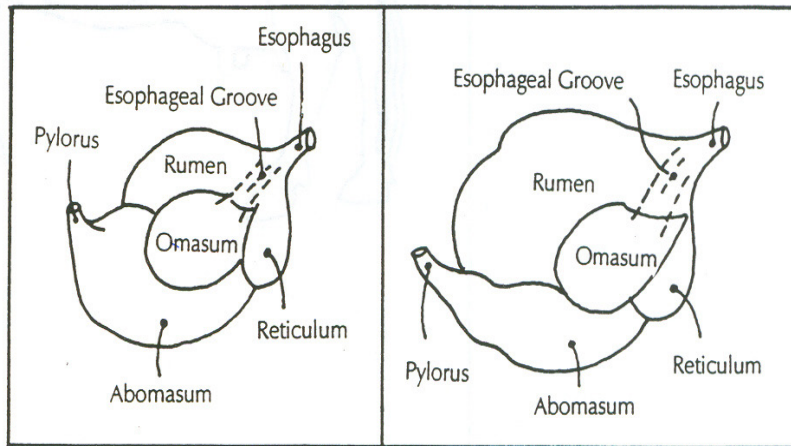
NEWBORN CALVES COMPARED TO ADULT COWS

In newborn calves, the abomasum is the only compartment that functions, so calves are called 'pre-ruminants'. A calf's abomasum takes up much more space inside her stomach than the abomasum of an adult cow does. See the table below for a comparison of the stomach of a cow and a calf:

	% OF TOTAL STOMACH	
	Newborn Calf	Adult Cow
Rumen	25%	80%
Reticulum	25%	6%
Omasum	10%	3%
Abomasum	40%	11%

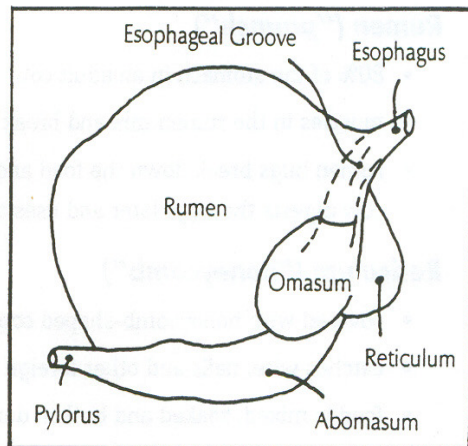


Development of a cow's stomach



First Week

Three to four months



Maturity

In newborn calves, the liquid she drinks passes through the **esophageal groove** (see diagram above) going straight into the abomasum, bypassing the other three compartments. The act of suckling, along with the smell and taste of milk, triggers the esophageal groove, which is a tunnel created in the digestive system when the muscular folds of the rumen and reticulum meet. The fluid she drinks flows through the tunnel, bypassing the other stomachs en route to the abomasum.

The other stomachs are bypassed at first because the calf needs to eat dry feed to develop the size of her rumen and the bugs contained within it. You can help stimulate the growth of the rest of her stomach through a good feeding program. You should offer a calf a dry grain mix within a few days of her birth. Grain stimulates rumen development, which increases the number and variety of rumen microbes. The microbes grow quickly and produce nutrients for the calf from the grain she eats.

OFF TO A GREAT START – KEYS TO FEEDING CALVES

Designing a feeding program for your calves is one of the keys to raising healthy replacement heifers. Well fed calves grow faster, can be bred at a younger age, and enter the milking herd sooner.

Well-fed calves can gain up to 1 kg a day without getting fat! Farmers should aim to have their calves gain 0.6 kg (small breeds) to 0.75 kg (large breeds) per day. Calves need to gain weight so they're big enough to have a calf by the time they're two years old. If it takes longer than that, the farmer begins to lose money because the heifer takes too long to become a milking cow and bring new calves into the herd.

There are several factors that are important to feeding calves, in addition to what is in the food they are getting. Here are some tips to make your calves "clear their plates":

Regular feeding - Calves must have regular mealtimes, eating at the same time each day, spread out evenly throughout the day; this prevents calves from getting too hungry. Calves that are too hungry eat too fast and can get upset stomachs.

Uniform food - Calves grow better when they eat pretty boring diets. They need to eat the same quality and quantity of food every day, given to them at the same temperature.

Clean Equipment - Always wash the feeding equipment between feedings to kill germs that could make calves sick. The wash water should be 80°C and after washing in soap and water, the nipples should be rinsed in a 10% bleach solution to disinfect them. Just like people, calves do not like to eat from dirty dishes!

Not too much, not too little - Avoid underfeeding and overfeeding. Underfeeding leaves calves hungry so they eat too fast at the next meal; underfeeding also prevents them from growing quickly. Overfeeding calves can cause scours or make them get too fat.

What Should I Feed My Calf?

Liquid Feeds

All calves should be fed colostrum for the first three days of their lives. After the first three days, you can feed sour colostrum, whole milk (fresh or acidified) or milk replacer. As calves get older, they can start eating dry feed.

Colostrum

Colostrum is the first milk that a cow gives after she has given birth to a calf. It is very important to feed the calf four litres (large breeds) or three litres (small breeds) within 30 minutes of birth, and another two litres within eight hours of birth.

Colostrum is very important for the calf in many ways:

- Calves are born without disease protection. Feeding a calf colostrum right away gives her immunity to diseases; these immunities will last until she is about 14 days old, when her own immune system starts to function. *(For more information on immunity provided by colostrum, see the Health section of 4-H Dairy Member Project Guide.)*
- Colostrum also cleans out a calf's digestive tract.
- Colostrum has three times more Vitamin D than normal milk and 100 times more Vitamin A than normal milk.
- Colostrum has a higher protein content to help calves to start growing.

The table below compares the contents of colostrum to normal milk:

NUTRIENT	COLOSTRUM	NORMAL MILK
Protein (builds muscles)	14%	3%
Milk fat (energy)	6%	4%
Lactose (milk sugar)	3%	5%
Minerals	1%	.7%
Total Solids (% not water)	24%	13%

Make sure you feed good colostrum!

- Colostrum should look and have the consistency of melted vanilla ice cream.
- Runny, thin colostrum or those mixed with blood are bad.
- Quality can be tested using a colostrometer to test the immunoglobulin levels.
- Bacterial counts can also be tested and should be less than 100,000 cfu/mL (cfu refers to coliform forming units). Calves have difficulty absorbing colostrum with high bacteria counts.
- Colostrum should not be pooled from several cows within the herd because it increases the risk of spreading diseases.

Storing colostrum

- Colostrum can be refrigerated (1°C-2°C) without harm for up to seven days.
- It can be frozen in 2-litre double-bagged freezer bags or plastic containers. It can be kept this way for up to one year. It is good to keep a supply of frozen colostrum so that if a cow gives birth and for some medical reason is unable to provide colostrum for her calf, frozen colostrum is available for it.
- Colostrum should be thawed in a warm water bath (50°C). It may be microwaved on low for short time periods as well if it is closely watched and mixed.

Sour Colostrum

Sour colostrum is a healthy meal for your calves and saves a lot in feeding costs. Sour colostrum is colostrum that's been allowed to ferment (sour), but that doesn't mean it's bad! Fermenting colostrum produces acid that keeps the milk from spoiling. Colostrum is fermented in a large garbage pail lined with a garbage bag and covered by a tight lid.

Making sour colostrum:

1. Clean a garbage pail thoroughly and line it with a clean garbage bag.
2. Obtain colostrum from the first six milkings of a cow. Do not use colostrum from cows with mastitis or those taking medicine. Especially on smaller farms, the simplest feeding system involves keeping a separate pail of sour colostrum for each cow.
3. Pour colostrum into the garbage pail and close the lid. Stir the colostrum each time you add more milk or remove milk to feed the calf.
4. To speed up souring, add one cup of fermented buttermilk to the colostrum. You can also store the garbage pail in a warm room, such as the milk house, for the first four days.
5. After five days, put the garbage pail in a cool place (5°C to 20°C). It takes 5 to 10 days for colostrum to sour. You can keep it for 30 days. After that, its nutrients start to break down and mold starts to grow, and it really smells!

Calves can be fed this sour colostrum for the first four to five weeks of life, and can then be weaned onto dry feed. Calves are fed diluted sour colostrum (three parts sour colostrum and two parts warm water).

Whole Milk

Whole milk is a great food source for growing calves but it is also the most expensive liquid to feed because it means that you will be unable to ship as much milk to the dairy and therefore, will receive less money from milk sales on your milk cheque.

If you overfeed or suddenly change the amount or quality of whole milk that the calf is drinking, you can make it sick - so it is important to stick to a regular diet.

The temperature of the milk is also important. Feed calves at their body temperature (approximately 38.5°C) to reduce the stress on their bodies.

Milk Replacer

Milk replacer is a substitute for milk. It is often fed because it is cheaper than feeding milk as it does not require milk to be kept out of the bulk tank. When purchasing milk replacer, it is important to read the label, just like when you are grocery shopping. Buying cheaper products might save money in the short term, but weak, small, unhealthy calves will cost you money in the future. Remember that high-quality milk replacers contain:

- A minimum of 20% crude protein (builds and repairs the calf's body).
- A minimum of 15% crude fat (provides energy for growth and muscle movement).
- 0.3% crude fibre.
- High quality milk products (buttermilk powder casein, dried whey, skim milk powder, milk albumin).
- The ability to mix easily with warm water and stay mixed until the calf drinks it.

Poor quality milk replacers often contain the following:

- Lower protein levels.
- Soybean flour (soy fed to young calves may cause allergic reactions in the digestive tract or diarrhea in young calves).
- Cereal flour.
- Meat solubles.

Calves have trouble digesting protein from plants until they are at least three weeks old.

It is also important to follow the instructions on the label.

Mixing milk replacer:

1. Read the instructions on the milk replacer container.
2. Measure the room temperature water and milk replacer powder you'll need for one feeding.
3. Sprinkle the powder on top of water.
4. Stir the mixture well with a wire whisk.
5. Make sure you keep the water at body temperature.

Methods of Feeding Milk to Calves

The following chart compares conventional feeding to nature's way of feeding calves:

	NATURE'S WAY	CONVENTIONAL FEEDING
Percent of Body Weight Fed (%)	20-25	8-15
Litres (L)	8-10	4-6
Gain (kg/day)	1.0	0.2-0.5
Number of meals per day	7	2-3
Nursing minutes per day (min)	48	6-8
Interval between feedings per day (hours)	4	10-14

Source: OMAFRA Factsheet "Mimicking Nature's Way for Milk-Fed Dairy Calves" by Neil Anderson. 2007

Conventional Feeding

These are some common ways of feeding calves on the dairy farm:

- Feeding calves with a nipple and bottle or pail (this is the most common feeding method).
- A computerized calf feeder that allows calves to drink certain amounts of milk.
- Mob feeding, which limits the amounts of milk available to many calves at once.
- Calves are fed on a regular schedule, usually two (sometimes three) times per day.
- Calves are fed a specific, measured amount. It is obvious from the table on the page prior that calves are not usually given as much to drink as they would drink naturally.
- Grain intake is higher in conventional feeding than in nature because of the limited milk intake.
- Feeding a calf from a nipple at a young age causes it to suck, which allows milk to pass into the abomasum through the esophageal groove. If milk goes into the wrong stomach, the calf gets gas and becomes bloated.
- Feeding a calf from a bottle is like feeding a human baby from a bottle.
- If you use a pail to feed the calf, remember that she probably is not getting as much milk into her abomasum where more of the nutrients can be absorbed by her body.
- If you use a pail, make sure the calf doesn't gulp the milk. To teach the calf to drink from a pail, let her suck your fingers on top of the milk in the pail until she learns to drink properly.

NATURE'S WAY OF FEEDING

- In nature, calves will drink until they are full, suckling several times throughout the day
- On modern dairy farms, natural feeding is not practical as it reduces milk produced for human consumption, and suckling can cause the calf to injure the cow's teats or infect her with germs.

Imitating Nature's Way of Feeding

- Free access systems allow calves to drink freely in a similar manner to nursing.

Acidified Milk

- Acidified milk has been fed in Finland since 1996, with farmers there reporting that it is inexpensive, enables them to use excess colostrum, requires minimal labour, and results in healthy calves with few bouts of diarrhea who do not often suck on other calves.

What is it?

- Acidified milk is whole milk that has diluted acid added to it.
- Formic acid is the most common acid used for acidification. 1 part 85% formic acid is added to 9 parts water to dilute the acid. For example, use 1 litre of formic acid to mix with 9 litres of water. Some retail outlets sell formic acid that is already diluted.
- The diluted acid is then mixed with cold colostrum (5 °C or less), whole milk or milk replacer. It takes 40-45mL of diluted acid for every 1 litre of colostrum or 30mL of acid for every 1 litre of milk or milk replacer. The pH of the mixture should be 4.0-4.5.
- The mixture should be stirred when combining the liquids, again within an hour of mixing and three times per day after that. The mixer can be as simple as a paint stir stick attached to a cordless drill.
- The low pH preserves the milk, inhibiting the growth of mold and bacteria, and allows the milk to be stored at room temperature for several days.

Feeding Acidified Milk

- Milk should be fed at an ambient temperature in the summer, and 20°C in the winter. In Canada it is challenging to keep the acidified milk warm enough in cold calf housing environments. Some farmers have experimented with using fish aquarium heaters or other methods to keep the milk warm.
- Store the milk in closed containers for one to three days before feeding to allow the acid contact time to kill bacteria; do not let flies or cats into the milk.
- Clean nipples, valve lines and containers with warm water and dish detergent.
- Provide free choice water and calf starter as well.
- Mount nipples 24-28 inches above the floor level for calves.

Penning

- Calves can be housed individually, allowing them to suckle without interference from other calves; individual housing helps to prevent the spread of diseases.
- When housed in groups, it is important to have several nipples available so that all calves can drink adequately throughout the day.
- Group sizes should be limited to no more than eight calves.

Costs

- Free choice acidified milk has higher costs compared to conventionally feeding milk or milk replacer because more is fed.
- Cost of the acid.
- The cost may be offset by better health and lowered veterinary and medicinal costs, as well as less time spent caring for sick calves.

Weaning

- Gradual weaning can be done by diluting the milk with more and more water over a one week period.

Dry Feeds

You can give calves dry grain a few days after they're born. They won't eat much of it for about a week, but it's still important to start calves on dry feed early. Why? Calves are ruminant animals without a working rumen! To get the rumen working, you must feed a calf dry feed so that her body "learns" to digest it.

Calves eating dry feed grow faster and have fewer health problems related to liquid feeding, such as scours.

Calf Starter

Calf starter is dry grain formulated to meet the energy needs of calves.

Calf starter should be:

- Palatable (tastes good and is easy to eat)
- Coarse (cracked, rolled, pelleted, not finely ground)
- 18% to 20% crude protein (CP)
- 72% to 74% total digestible nutrients (TDN). TDN is another word for the energy in feed

Hay

- Hay is also important to a calf's diet once she is 2-3 months old. She should be fed long, soft, dry hay starting about one week before she is weaned. Hay helps the calf's stomach grow and gives her extra energy.

Weaning

Weaning is when you stop giving your calf milk and switch her entirely over to water and dry feeds.

Your calf should be eating 1.0 kg per day of dry calf starter for several days before she is weaned, and should already be eating hay.

Calves should be weaned before they are eight weeks old to save money. Most savings result from reduced labour, as it takes less time to feed calf starter than it does liquid feed and it takes less time to clean out calf housing. Calves eating a liquid (milk-based) diet have looser manure and are more likely to suffer from calf scours.

Calves left on milk a long time (i.e. more than three months) can also get very fat. This can result in health problems and decreased milk production later in life.

Feeding Heifers and Dry Cows

These groups of animals need healthy, nutritious diets made especially for them. Heifers need to grow, but not get too fat. Older heifers also need feed to help support the fetuses growing inside their bodies.

Heifers must gain 0.6 kg (small breeds) to 0.75 kg (large breeds) a day to ensure that they are large enough and ready to breed at 14 to 15 months of age in order to calve at 23 to 24 months of age.

Heifers move through four feeding stages:

Post-Weaning Stage (2 to 6 months old)

- Feed a palatable calf starter and good quality hay.
- At three or four months of age, heifers can be switched from calf starter to grains.

Heifer Stage (6 to 12 months old)

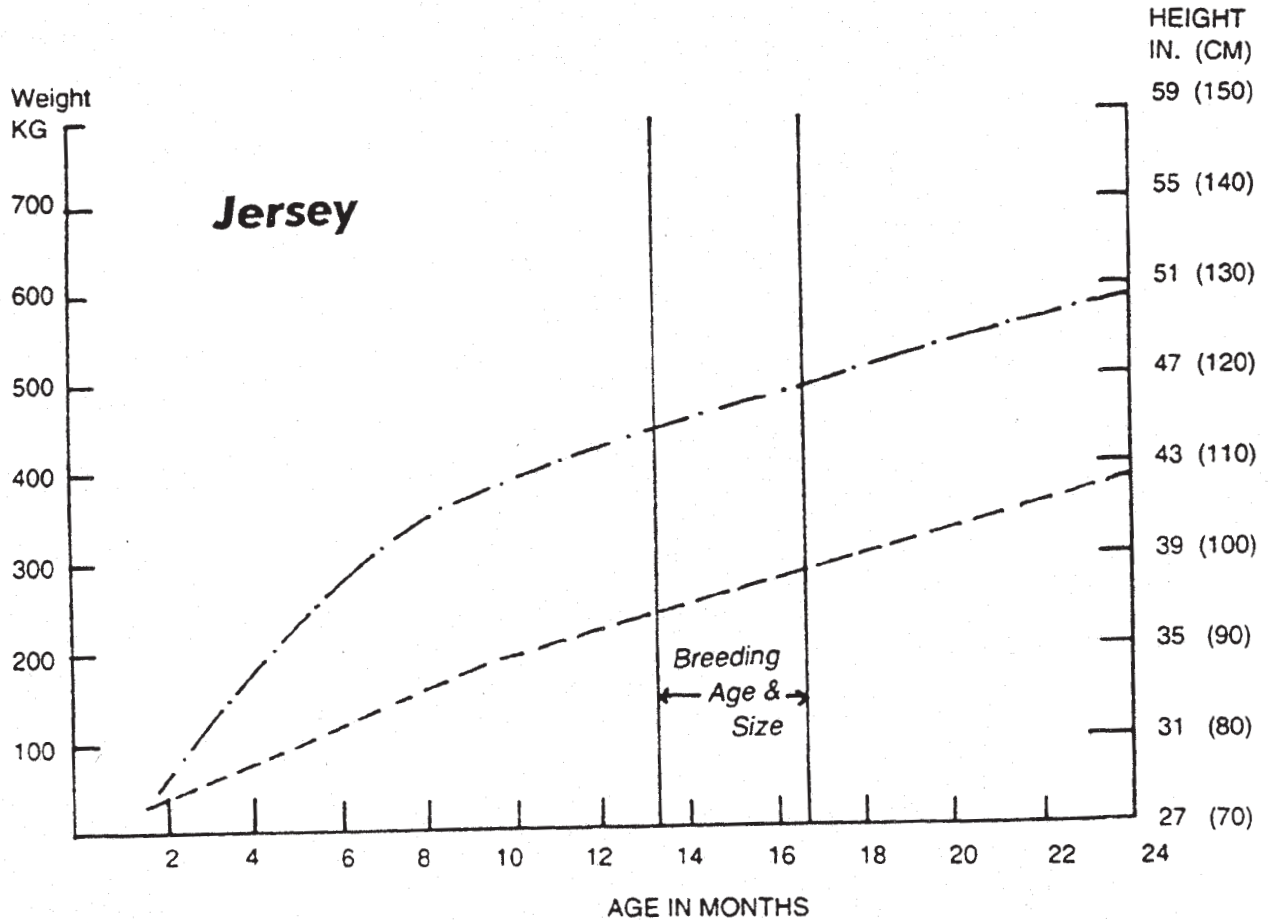
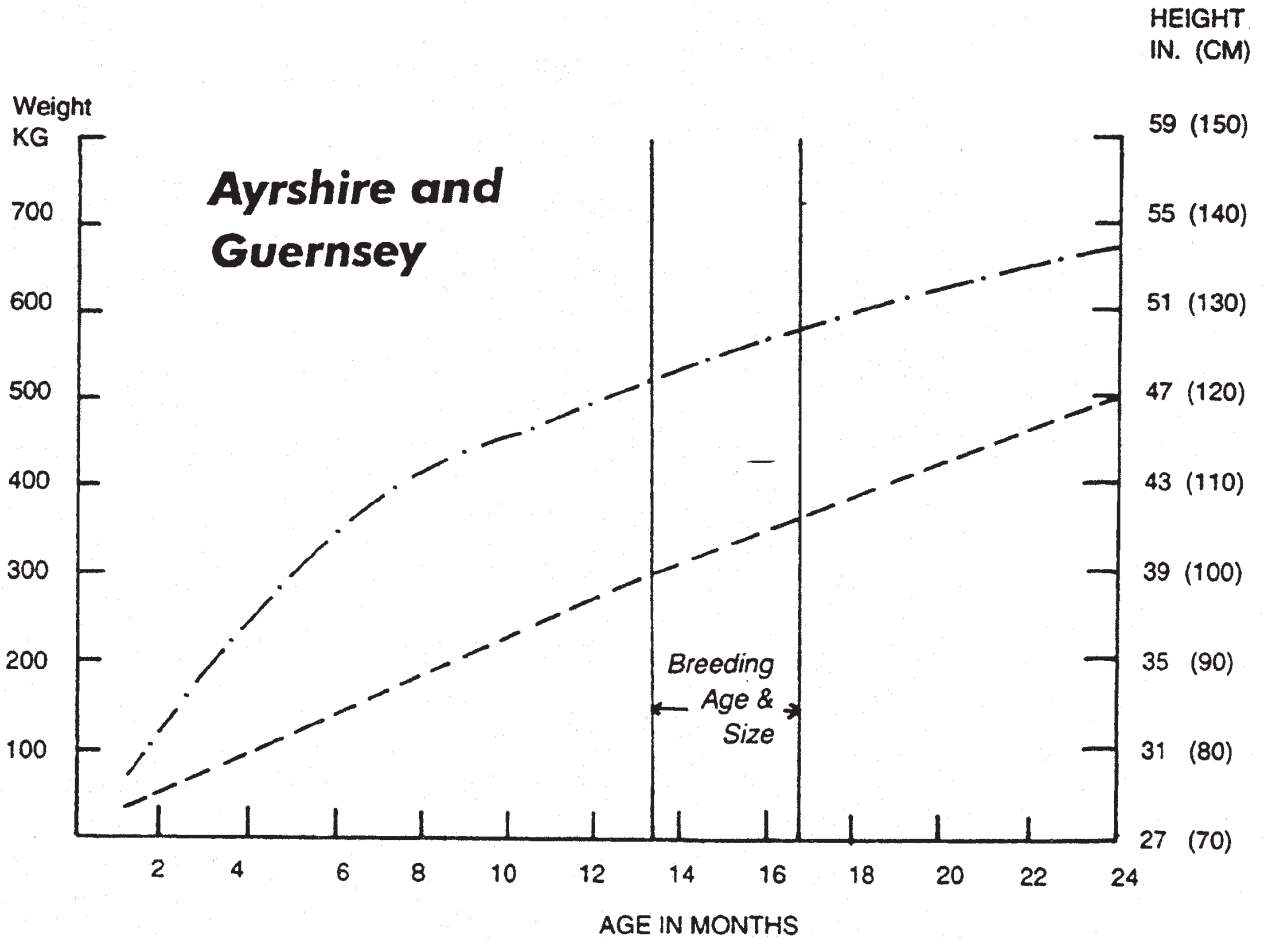
- At least half of the total roughage dry matter (DM) should be from dry hay. The rest can be from haylage, corn silage, total mixed ration or pasture (6-9 months).
- Balance the ration by varying the amount and type of grain according to the nutrients supplied by the forage being fed (9-12 months).
- Balance the ration for minerals and vitamins using a pre-mix that is top-dressed on forages or added to grains. This is a lot like eating sugar on your cereal – it tastes good and gives you more energy!

Breeding Stage (12 to 18 months)

- This is a key feeding time because heifers must be healthy and have proper diets to improve their reproductive success.
- Feed a balanced ration, with mineral and vitamin pre-mixes, just like younger heifers.
- Breeding weights, achieved partly by proper nutrition, range from 366kg for large breeds to 268kg for small breeds. If heifers aren't large enough to breed at 14 to 15 months of age, you need to figure out what is going wrong with your feeding program or conditions related to the raising of your heifers.

Bred Heifer Stage (18 to 24 months, or until close to calving)

- Feed to prevent cows from getting fat but still keep them growing. Fat cows have problems calving and will milk less.
- Don't feed too much high energy forage such as corn silage (as it will make them fat).
- Maintain a balanced ration of roughages, grains and minerals.
- Two to three weeks before calving, switch to a close-up dry cow diet.



FEEDING DRY COWS

Dry cows need to be fed in stages, just like heifers do! As a dry cow gets closer to calving, her diet changes because her body is getting ready to give birth. Dry cows are usually split into two groups, far-off dry cows and close-up dry cows. Diets for dry cows were traditionally based on a 60-day dry period, but today, many farmers are increasing productive life by managing cows with the 45-day dry periods. The feeding schedule below is based on a 60-day dry period. Cows within a short 45-day dry period are fed slightly less forages and more grain.

Far-off Dry Period - Dry cows who are still several weeks away from calving:

You need to keep these cows on a diet that is very high in forages. In fact, 85% to 100% of her feed intake should be forages. Each day, dry cows eat about 2% of their body weight in dry matter feed.

Close-up Dry Period - Dry cows who are two to four weeks from calving:

Close-up dry cows eat less than far-off dry cows, so they need to be fed differently. You need to put more nutrients in the ration because they eat less volume of feed. You also need to start lead feeding dry cows.

Lead-feeding refers to gradually increasing the amount of grain a dry cow eats during the two weeks prior to calving. After calving, cows need more energy to produce milk, which means that she needs to eat more grains. Lead-feeding prepares the cow's stomach for a high grain diet.

Pre-Calving Cows

Cows that are near calving require special attention. What they eat will directly affect their health, their calving and the amount of milk they'll give during their lactation. A poor diet can result in milk fever, ketosis or other disorders.

To help prevent milk fever, the standard practice for feeding pre-calving cows is to limit the amount of calcium in their diets. Limiting calcium may sound strange, but by reducing the calcium level in a cow's feed, her body learns to absorb calcium from her bones and digestive tract when there is a shortage in her bloodstream. That way, her body will know how to deal with the sudden need for calcium at calving.

More and more dairy farmers are trying to balance dietary cation-anion difference (DCAD) in pre-calving rations to prevent milk fever.

Digging Deeper: Dietary Cation-Anion Difference (DCAD)

DCAD is a complicated term referring to how different molecules in the cow's body and her feed react together. A ration with a negative DCAD can create the same effect as reducing dietary calcium.

Feeding a negative DCAD ration is like giving a cow heartburn on purpose. The cow's body doesn't like heartburn, so she needs to take an antacid, kind of like you taking a Tums or a Rolaids. Since there is no pill for the cow to take, she uses the calcium from her own bones. Therefore, the cow's body learns to absorb calcium from her internal resources when it has a shortage.

The principles behind DCAD involve a little bit of chemistry:

- Cations, such as sodium (Na^+) and potassium (K^+), carry positive charges and increase blood pH.
- Anions, such as chlorine (Cl^-) and Sulfur (S^{2-}), carry negative charges and lower blood pH. A low blood pH means that the cow's blood is more acidic.
- When the difference between cations and anions is negative (i.e. more anions than cations), the blood pH is lowered and it becomes acidic. To neutralize the lower pH, the cow uses calcium from her bones.

Feeding a ration with negative DCAD must be done carefully. The following tips are useful when feeding these rations:

- Test your ration often to make sure the right amount of anionic salts are added.
- Use combinations of two to four anionic salts to reduce taste problems.
- Feed anionic salts in a total-mixed-ration so cows won't avoid eating the salts.
- Feed negative DCAD rations at least 14 days before calving.
- Don't give DCAD rations to milking cows.
- Most importantly - consult a nutritionist before feeding a DCAD ration. He or she can give you the exact ration requirements for this feeding program.

FEEDING MILK COWS

The most important thing about feeding milk cows is to make sure each cow is fed a *balanced ration*. A balanced ration contains all the nutrients a cow needs for her health and helps her meet her milking potential. Great cows may only be so-so milkers if they are not fed properly.

A balanced ration needs:

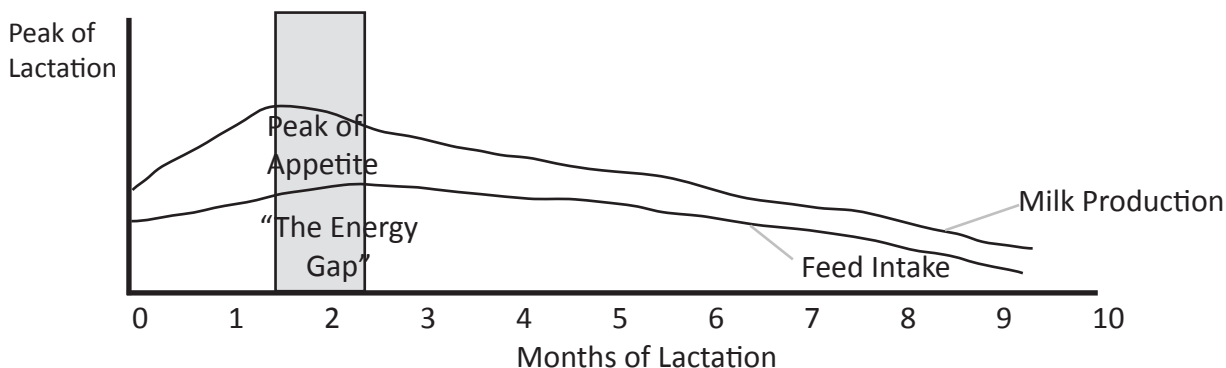
- Energy
- Protein
- Vitamins
- Minerals
- Water

The trick when feeding a balanced ration is to feed the cows the right amount of the different feeds to get the proper amounts of the required nutrients. This balancing act is very important to the cow's health and milk production.

The energy required for milk production often exceeds a cow's feed intake throughout her lactation, as seen in the diagram. Balanced rations are required to reduce or even eliminate this potential energy gap. The amount that the cow wants to and is able to eat are limiting factors that affect feed intake. This could result in less milk production than the cow is genetically capable of and/or weight loss as the cow utilizes her body's fat reserves as energy for milk production. Proper diets limit the amount of weight loss, since thin cows are more difficult to breed and milk production is compromised. At the end of a cow's lactation, when she is not giving as much milk, her feed intake energy may often surpass the energy required for milk production. But by that time, her body is usually using energy to prepare itself for calving again.

Energy = Total Digestible Nutrients (TDN)

A cow's diet needs to contain 75% TDN



COMPONENTS OF A BALANCED RATION

Energy

Cows need energy for:

- Growth
- Reproduction
- Milk production
- Muscle movement

Cows get energy from two sources: **carbohydrates** and **fats**.

Carbohydrates are found in grains and forages such as corn and hay. The carbohydrates found in grain are sugars and starches, which are easy to digest. Easy digestion means they have a high feeding value. Carbohydrates found in forages are harder to digest. In forages, carbohydrates are part of the plant's fibre, called cellulose. Cows need this 'hard to digest' fibre to keep their stomachs working. Think of plant fibre as 'weights' that a cow uses to keep her stomach in shape. Feeds containing cellulose have a lower digestibility, but cows are able to digest them with the help of their rumen micro-organisms.

Fat gives cows a lot of energy in a small bite. The energy is much more concentrated than in carbohydrates, so fats are found in small doses in many feeds, including grain. Fat can be added to a cow's ration as well. The most common way to add fat is by feeding the cow soybeans.

Protein is important for a cow's growth. Protein is broken down into amino acids during digestion. The amino acids are absorbed in the intestine and are carried through the bloodstream to build and repair several body parts and components such as:

- Organs
- Bones
- Skin
- Blood
- Hair
- Milk protein
- Hooves

Protein can be found in all feeds, including grain and forages. Alfalfa, hay and haylage are high in protein. So are oil seeds such as soybeans and canola. Some cows also get added protein, called supplements. These supplements are usually by-products created from the processing of oil seeds. For example, soybean meal, a protein supplement, is left over after soybeans are crushed to make margarine for people.

Protein in a balanced diet is called Crude Protein (CP). Milk cows need 15-19% CP.

Bypass proteins can also be fed as an additional protein source. Such proteins are called “bypass” proteins because they are resistant to rumen bacterial breakdown so they are digested in the intestines, not the rumen. Production benefits are seen by feeding bypass proteins to high producing animals. The greatest benefits are seen when cows are on a high silage diet because fermentation transfers protein to more soluble forms, which will be used by rumen bacteria rather than the cow directly. Bypass proteins make more protein readily available to the cow. Excellent sources of bypass proteins include:

- Dried corn gluten feed
- Dried distillers grains
- Dried brewers grains
- Corn gluten meal
- Fish meal

Feeding too much protein causes the nitrogen component to be excreted in the urine. It is important to balance the animal’s ration to prevent wasting money on excess protein, it is also more environmentally friendly.

Vitamins

Vitamins are nutrients that are only needed in small amounts, but they are still very important. They can either be fat or water soluble.

VITAMIN	WHAT IT DOES	WHERE IT’S FOUND IN FEED
Fat Soluble		
Vitamin A	Helps with normal night vision, cell and bone growth	Carotene
Vitamin D	Strong bones and teeth	Cow can make her own when exposed to sunlight
Vitamin E	Muscle tone and development	Vitamins are usually added to feed in a vitamin and mineral premix
Vitamin K	Helps with blood clotting	(commercial supplement)
Water Soluble		
Vitamin B	Needed to change feed into energy; important component for blood	
Vitamin C	Strengthens bones and teeth	

Minerals

Minerals make up a very small part of a cow's diet; however, without them, cattle can get sick. Minerals are divided into two groups: major and trace. Cows need major (macro) minerals in larger amounts than trace (micro) minerals.

Mineral	Needed for...
Major (Macro)	
Calcium	Bones, milk production, muscles
Phosphorus	Bones, milk production, digestion
Potassium	Nerves
Sodium	Digestion, use of nutrients
Chlorine	Digestion, use of nutrients
Sulphur	Digestion
Trace (Micro)	
Selenium	Tissue repair, healthy calves
Cobalt	Digestion, use of Vitamin B12
Iron	Red blood cells
Copper	Blood, body tissue
Zinc	Hooves, skin, growth
Molybdenum	Energy use, growth, iron use
Manganese	Growth, bones, reproduction, nervous system
Iodine	Metabolism (rate food is used in the body as energy)

Did you know?

Salt is made up of sodium and chlorine, two major minerals needed by cows.

A milking cow needs 30-100g of salt each day, depending on how much milk she produces.

Did you know?

For a milking cow, the ratio of calcium to phosphorus should be 1.8-2.1:1. For a dry cow, this ratio should be 1:1.

Water

Cows need lots of water! In fact, this is the most important nutrient that her body needs. A cow's body is 70% water. A cow needs to drink five litres of water to produce one litre of milk. Cows also need water to:

- Cool down
- Digest food
- Flush out their body wastes
- Maintain body fluids

A cow should have free access to water. That way, she'll get enough to drink each day.

There are several factors that influence the amount of water a cow drinks each day:

- Air temperature
- Humidity
- Wind speed
- Feed temperature
- Growth rate
- Amount of water in feed
- Salt in feed
- Size of animal
- Feed intake
- Milk production

INGREDIENTS OF A BALANCED RATION

The nutrients that are required by a cow can be found in the following feeds:

Forages (roughages) - Cows eat forages because their four-chambered stomachs can break down the hard-to-digest fibre found in forages. Cows get energy from this fibre. The feed value of roughages depends on:

- The Plant
- Soil Quality
- Crop Fertilization
- Length at Growing Season (younger, more immature plants yield higher feed values and are more palatable)
- Harvest Techniques
- Storage

You can find out the feed value of roughages by taking samples and sending them away for a feed analysis, which are performed in a laboratory.

There are a few types of forages, including hay, haylage, and corn silage:

Hay - A very common forage made from legumes such as alfalfa and grasses such as timothy. Hay is cut in the summer and dried in the sun, then stored after it is baled. It is best to store dry hay inside to prevent it from getting wet and moldy.

Haylage - Made from hay cut early in the season and then wrapped, bagged or stored in a silo. Haylage should be green and smell like clean, sharp vinegar. Haylage has about the same energy as hay, but it is wet. This means that the leaves stay on the stem of the plant. Because most of the nutrients found in hay are in the leaves, haylage has more nutrients than hay.

Corn silage - Made by chopping the cob, leaves and stalks of corn plants. The chopped corn is put in a silo or a bag to ferment, resulting in corn silage. Corn silage has high energy and low protein.

Another component of a balanced ration is concentrates.

Concentrates - Provide a “concentrated” source of energy. Concentrates are the sweet tasting part of a cow’s diet, so you have to make sure you don’t let cows ‘pig out’ on concentrates. Concentrates are a mix of grains and other products. Examples of concentrates are:

- Grains such as corn, oats and barley.
- Distillery and brewing by-products.
- Oilseed meals, such as soybean, linseed and canola meal.
- Whole seeds, such as soybean and cotton seed.
- Non-protein nitrogen (NPN), such as feed-grade urea and anhydrous ammonia.

Farmers can buy concentrates that are already mixed with vitamins and minerals or can make their own concentrates and purchase a mineral mix to add.

Grains are rolled, ground or cracked to make them easier to digest. Whole grains are harder for the cows to digest.

Protein supplements and mineral and vitamin supplements round out a cow-balanced ration:

Protein supplements – High protein oil seeds such as soybeans and canola, or by-products like soybean meal, distiller’s grain and brewer’s grains are considered. These protein supplements add a concentrated source of protein to the ration.

Mineral and vitamin supplements – Add extra salt minerals and vitamins to the ration. Most of these nutrients come from other feeds in the ration, but the supplements boost the level a bit higher.

Ration Recipe

To create a balanced ration, you need a recipe. To get the right recipe, you need to:

- Know the weights of your cows.
- Know the stage of lactation and current production levels of your cows.
- Know the percentage of two-year olds in your milking herd.
- Weigh the feeds that the cows eat already.
- Aim for a ration with lots of forage
- Feed the cow's stomach – micro-organisms in the cow's rumen need to be fed for healthy digestion.
- Use concentrated sources of protein, such as roasted beans, soymeal, and corn gluten meal.
- Ask a nutrition expert to help you create the right ration recipe for your cows.

Digging Deeper Recipe Testing

Feeding the right ration is impossible if you don't know what kind of nutrients are in a cow's feeds. To find out, you must have the feed tested. Feed tests let you turn hay, soybeans, grain, and other feeds into a great ration.

Listed below are the actual ingredients of a sample balanced ration. The ration is balanced for a cow that milks 40kg a day. The amount of energy, protein and vitamins in the example ration are listed below the actual ingredients.

Alfalfa hay	6.1kg
Corn silage	9.1kg
High-moisture corn	8.2kg
Soybean meal	2.5kg
Soy mill feed	2.3kg
Distiller's grain	1.4kg
Dry fat	0.2kg
Minerals, vitamins, additives	0.2kg

Balanced ration for those ingredients:

Protein	
Crude protein (CP)	17%
Degradable Intake Protein	60% of CP
Undegradable Intake Protein	40% of CP
Energy	
Net Energy	1.72Mcal/kg
Total Digestible Nutrients	75%
Fibre	
Crude fibre	15%
Acid detergent fibre	19%
Neutral detergent fibre	25%
Minerals	
All major and trace minerals	
Vitamins	
Vitamin A	3200 IU/kg
Vitamin D	1000 IU/kg
Vitamin E	15 IU/kg

METHODS OF FEEDING

Total Mixed Rations (TMR) vs. Traditional Feeding Programs

Traditionally, farmers have fed forages and concentrates separately, usually adding top dress for energy, protein, and vitamins. But TMRs are rations that include all feeds mixed together. Think of it as a stir-fry for cows. All of the ingredients are mixed together and contain all of the minerals, carbohydrates, fat, protein and vitamins a cow needs to stay healthy and milk well.

The chart below compares the two methods of feeding.

	Traditional Feeding	TMR
Description	<ul style="list-style-type: none"> • Feed forage, concentrates and top dress separately. 	<ul style="list-style-type: none"> • Blend all of the ration ingredients and feed one mixture.
Equipment Requirements	<ul style="list-style-type: none"> • Feed storage facilities (i.e. silos, hay mow, grain bins). • Means of getting feed to cattle (i.e. feed carts, computer system, pickup trucks, etc.). • Scales. 	<ul style="list-style-type: none"> • Feed storage facilities (i.e. silos, hay mow, grain bins). • Room for mixing TMR that is attached to feed storage facilities. • Storage for bags of minerals, vitamins, etc. • Mixer and scales. • Feed delivery system.
Labour Requirements	<ul style="list-style-type: none"> • Getting feed from storage facility to cattle. 	<ul style="list-style-type: none"> • Weighing and mixing feed daily. • Moisture-testing ingredients weekly. • Getting the TMR from the mixer to the cattle.
Feed Program Benefits	<ul style="list-style-type: none"> • Easier to implement. • Fewer expenses. • Can give individual attention to cows. • Feed mistakes affect few cows. • Expensive feeds aren't wasted on cows that don't need them. 	<ul style="list-style-type: none"> • Cows can't pick over what they don't like. • Can increase production 10%-20%. • Less labour. • Reduced feed waste. • Average amount and costs of feed for each cow.
Feed Program Disadvantages	<ul style="list-style-type: none"> • Cows can avoid what they don't like (i.e. minerals) and therefore not get a balanced ration. • Labour intensive (delivering each foodstuff separately). 	<ul style="list-style-type: none"> • Expensive to start due to equipment costs • Continually changing ration to account for moisture changes. • Mistakes are serious because they affect all cows. • May have to redesign facilities to accommodate a TMR system.

FEEDING TO ALTER MILK COMPOSITION

What you feed a cow not only changes how much milk she gives, but also its composition! It's important to know how feeding changes milk composition because of the way dairy farmers are paid for their milk. Multiple component pricing pays producers according to the components in their milk, such as butterfat and protein. Improving components within defined solids-not-fat ratio caps can add money to your milk cheque each month.

In order to change a cow's milk composition by feeding a proper ration, the ration must be balanced. Otherwise, you could end up with a sick cow instead of a bigger milk cheque. The table below shows how feeding effects production:

	Milk Yield (kg)	Percent Protein	Percent Fat
Greater dry matter intake	++	0?	0?
More forages, less grain	-	-	+
Less forage, more grain	+	+	-
More corn silage, less haylage	+	+	-?
More fermentable NSC	+	+	-
More ADF/NDF	-	-	+
More added fat	+	-	+?
Higher crude protein	+	+	0
More undegradable protein	+	+	0
More limiting amino acids	+	+	0
Feed TMR	+	0	+
Feed grain more often	+	+	+
Use high-moisture corn	+	+	-?
Grind/roll corn finer	+	+	-?
Steam-flake grain	+	+	-?

+ = positive effect

- = negative effect

0 = neutral

? = unclear

Source: Adapted from Hutjens and Shanks, 1993

TIPS FOR GETTING THE COWS TO “CLEAR THEIR PLATES”!

Increasing how much dry feed cows eat is a major goal of dairy feeding programs. This leads to better milk production. To get your cows to “clear their plates” follow these tips:

- Let cows have access to food 24 hours a day and have fresh feed in bunks or mangers after milking. Cows are hungry and thirsty after they are milked. As well, feed several meals a day instead of just one or two big meals.
- Make sure they have fresh, clean water all of the time. Cows that drink more eat more dry matter.
- Adapt your feeding times to the likes of your cows. Feed them when they want to eat, not when you want to feed them.
- Clean mangers and bunks daily - cows are picky eaters! The leftovers are probably there because the cows don't want to eat them. The smell of rotting, stale feed in a manger spoils a cow's appetite for the fresh feed on top.
- Sweep feed up to tied cows frequently or create activity around a feed bunk. Curious cows will take a bite.
- Keep cows healthy and comfortable - then they'll eat more.
- Feed a TMR (total mixed ration). It includes all of the parts of a balanced ration, blended together, instead of feeding these parts separately.
- Design feed bunks with cows in mind:
 - Cows eat less at head-to-head feeders because of social interactions. Keep head-to-head feeders at least 3 m apart.
 - Give each cow at least 60 cm of bunk space to eat from.
 - Eating in the heads down, grazing position increases saliva and the amount eaten. Mangers should be 10 cm above hoof level.
 - Smooth mangers are better because stale feed gets caught in rough surfaces.
 - Cows fear light and dark patterns because they have trouble perceiving depth. Try using light coloured tile or liners in feeders.
- Make it easy for cows to get to and from feed. Have wide passages and non-slip floors for them to walk on.



VO-COW-BULARY

Acid Detergent Fibre (ADF)

ADF is the least digestible part of the plant fibre and is one type of carbohydrate. Forages contain a lot of ADF. ADF predicts the amount of energy in feed – the more ADF, the less energy. Cows need a ration of at least 19% ADF for proper digestion.

Amino Acids

These are building blocks, or smaller pieces, that make up feed protein. The protein in different types of feed is made up of different amino acids. Having the right balance of these acids benefits both the rumen bugs and the cow. This balance makes the protein provided by the feed more useful.

Bypass Proteins

Proteins that resist breakdown by rumen bacteria and are digested in the intestines.

Crude Protein (CP)

Repairs and builds organs, skin, hair, hooves, bones, blood and milk protein. Milking cows need 15-19% CP in their diets.

Degradable Intake Protein (DIP)

Comes from legumes and some protein supplements. Rumen bugs eat this type of protein very quickly. Degradable Intake Protein is also called Soluble Protein.

Digestible Neutral Detergent Fibre (DNDF)

The portion of NDF digested at specific levels of feed intake. It is a percentage of the NDF.

Dry Matter Intake (DMI)

The amount of dry matter (DM) in the ration, if the water was removed from it. The first 6kg of DM a cow eats keeps her alive. For every extra kilogram after that, the cow produces an extra 2.5kg of milk.

Effective Fibre

You can feed the proper amount of ADF and NDF, but if the forage is ground too finely, the cow won't take in the proper amount. Cows don't chew finely chopped forages enough for proper digestion, which results in sick cows. For the best fibre intake, forages must be coarse.

Neutral Detergent Fibre (NDF)

NDF is most of the plant fibre and represents the bulkiness of the feed. Cows need about 28% NDF for proper rumen function.

Non-fibre Carbohydrate

Non-fibre carbohydrates, such as sugars and starches, are easy to digest. This means they're a good source of energy. Grains are high in non-fibre carbohydrates.

Total Digestible Nutrients (TDN)

Refers to the amount of energy available for the cow in her feed.

Undegradable Intake Protein (UIP) (also called bypass protein)

Comes from foods such as roasted soybeans. Rumen bugs cannot eat this type of protein. It bypasses the rumen and is digested in the other parts of the cow's stomach or her small intestine.

Vitamins and Minerals

Cows need vitamins and minerals in small amounts. That's why some of them are measured in parts per million. But, these small amounts of vitamins and minerals keep cows healthy.

REFERENCES AND RESOURCES - NUTRITION

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Anderson, N. "When they get enough feed they're healthier and need fewer drugs" OMAFRA Facts. www.omafra.gov.on.ca/english/livestock/dairy/facts/headstart.htm. July 2001. Accessed January 19, 2008.

Ontario Veal Association. "Colostrum Management – Off to a healthy start naturally!" www.calfcare.ca, 2007.

RELATED ACTIVITIES (SEE LEADERS' GUIDE)

Ruminant vs. Monogastric Animals	Nutrition	All ages
Digestion Game	Nutrition	All ages
Showcase on Stomachs	Nutrition	All ages
Build a Ruminant Digestive System	Nutrition	All ages
Digestion - A Chemical Reaction	Nutrition	Junior members
Ruminant Diseases	Nutrition	All ages
Feeding the Calves	Nutrition	All ages
Reading the Label	Nutrition	All ages
Decisions, Decisions	Nutrition	Senior members
Ingredient Classification Game	Nutrition	All ages
Snatch the Feed	Nutrition	All ages
Name the Feed Relay	Nutrition	All ages
Matching Feeds Game	Nutrition	All ages
Bringing Home Dinner	Nutrition	All ages
Match the Nutrients Game	Nutrition	All ages
Different Rations	Nutrition	All ages
Feeding Program Pros & Cons	Nutrition	All ages
Designing a Feeding Program	Nutrition	All ages/Senior members
Feeding a TMR	Nutrition	All ages
Judging a Balanced Ration	Nutrition	All ages
The Judge's Seat - Feedstuffs	Nutrition	All ages
Nutrition Crossword	Nutrition	All ages

THE BASICS

Calves, Heifers, Dry Cows and Milk Cows ... They All Need The Same Basic Things!

Animals have the same basic needs that humans do – food, water, shelter from the cold and heat, and a dry place to live. Think about your own house. Do you have air conditioning in the summer? Heating in the winter? Do you have your own space or do you share a room? All of these factors, and more, affect how happy you are in the space that you live.

Just like people, cattle will be happier and healthier if they have a good place to live. Animals may not be able to tell you if they do not like where they are, but they show you in other ways. For example, getting sick versus staying healthy, growing slowly versus quickly, and being energetic versus sluggish.

Cattle have the same basic needs through all stages of their lives: adequate food and water, comfortable and dry surroundings, a well-ventilated area and frequent manure removal. The most comfortable cows, heifers and calves will grow, thrive and be more productive than ones who are less comfortable. Cow comfort is effected by many different factors:

- Water
- Feeding Systems
- Manure Removal
- Ventilation
- Stall Base
- Bedding

Water and Feeding Systems

- Water must be clean and readily available for all animals.
- Feeding areas must provide enough manger space for the size of the animal. The amount of space required increases as an animal grows until they are mature cows. Each milking cows need approximately 60 cm of manger space.
- Cattle do not like sticking their heads into patterns with light and dark because they cannot perceive depth, so the lighting in the feeding area should be consistent.
- There should also be sufficient manger space for all animals in a grouping to be able to eat.

Did You Know...

A mature dairy cow exhales about 12 litres of water into the air each day!

Manure Removal

Manure removal is important to reduce odours, reduce the number of flies and other pests, and to keep animals clean. The manure removal system should be designed to be friendly to the cows and the environment.

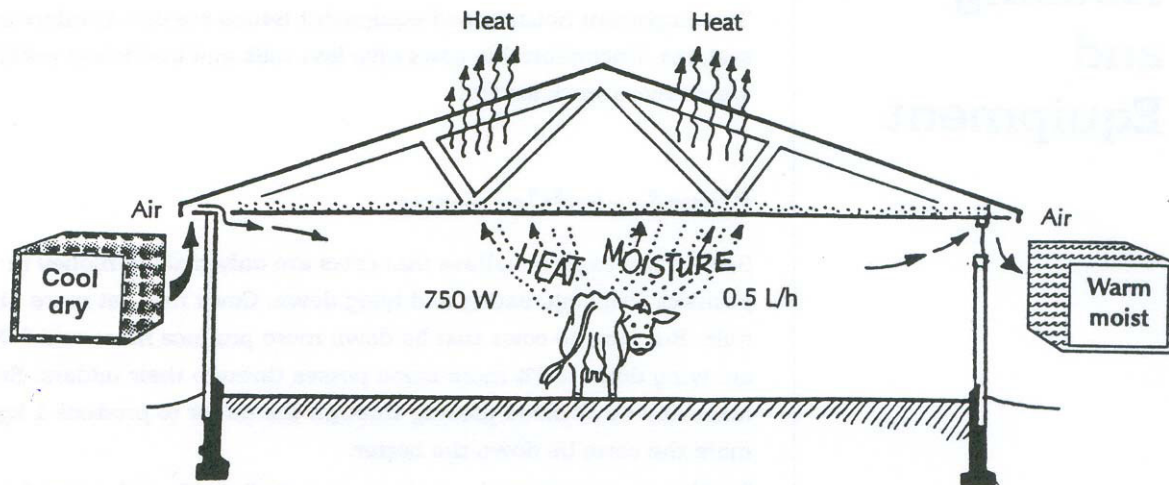
Ventilation

Ventilation systems serve two purposes:

1. Keep cattle cool in the summer.
2. Remove moisture from the air in the winter.

Cows need fresh, dry air and would prefer to be cold and dry versus warm and damp. Ventilation must ensure that humidity in the barn never exceeds 75% to 80%. There are three different types of ventilation:

- **Cold Environment** - Ventilation is the result of natural air flow. In the winter, these barns stay close to the temperature outside. In the summer, air inlets are opened as much as possible for maximum air flow and cooling. Many new barns are being constructed with curtains over the openings that can be raised or lowered, depending on the temperature outside.
- **Warm Environment** - The barn is kept ventilated and at a more constant temperature by mechanical ventilation and insulation. Mechanical ventilation is more expensive than natural ventilation because it results in monthly electricity bills.
- **Modified Environment** - A combination of mechanical and natural ventilation is used to regulate the barn. An example would be a barn that has fans for mechanical ventilation, as well as windows for natural air flow.



Tunnel Ventilation

Tunnel ventilation is becoming an increasingly popular method of creating air flow in dairy barns. Tunnel ventilation is a system where fans are installed at an opening at one end of the barn, usually on the main level or in an upper level with a boxed-in opening. Placing the fans as such allows air to flow up from the lower level. The fans pull air through the barn, creating continuous air flow. Really long barns would also need fans in the centre of the barn to pull enough air through. The air in a barn should flow at a rate of 250-feet per minute.

How do you figure out what fans you need for your barn?

The number and size of fans depends on the size of your barn and the speed of air flow. The required fan capacity is found by multiplying the useable cross-sectional area of the barn (height x width) by the desired air speed. Note that the space taken up by cattle stalls reduces the net area available for air flow. The most common fans are 48 inches (1200 mm) and will move about 20,000 cfm (cubic feet per minute) each.

Stall Base

The stall base is the material located under the bedding in an animal's stall or pack. If compared to your bed at home, your sheets would be the "bedding" and your mattress would be your "stall base". While stall base is of particular concern in milking cow housing, however, it is also important to ensure that calf, heifer and dry cow housing environments keep animals comfortable in order to help them thrive.

Different stall or pen base options include:

- Earth
- Rubber mats over concrete
- Rubber tires embedded in the earth
- Cow mattresses
- Wooden planks

Bedding

Regardless of how comfortable the stall or pack base is, bedding is always required to keep animals clean and dry. More comfortable base types do not require as much bedding as less comfortable ones. If you were sleeping on cement, you would want a lot more pillows and blankets underneath you than if you were sleeping on a rubber mattress.

There are several factors to consider when selecting a base and bedding type for your farm, including the cost, comfort level, cleanliness, potential bacteria growth, potential for injury, and maintenance. The table below compares different types of bedding. For specific information on the cost of various bedding mediums, contact your local supplier.

Base/ Bedding	Annual Cost per Cow \$ = Low Cost (less than \$10/year) \$\$ = Moderate (less than \$40/year) \$\$\$ = High (less than \$100/year) \$\$\$\$ = Very High (greater than \$100/year)	Cow Preference	Cow Appearance	Potential Bacterial Growth	Potential for Injury	Maintenance
Clay/CS*	\$\$	High	Clean	Medium	Low	High
Concrete	\$	Low	Dirty	High	High	Low
Wood/Plank/CS*	\$\$\$	Low	Moderate	High	High	Medium-High
Concrete/CS*/Rubber Mat	\$\$\$	Low	Moderate	High	Medium-High	Low-Medium
Concrete/CS*/Layered Mat	\$\$	High	Clean	?	Low	Low
Rubber Tires in Concrete/CS*	\$\$	High	Clean	Medium-High	Low	Medium-High
Concrete/CS*/Mattress	\$\$	High	Clean	?	Low	Low
Concrete/Long Straw	\$\$\$\$	High	Clean	Medium	Low	Medium-High
Concrete/Sawdust	\$\$\$	Medium	Moderate	High	Medium-High	Medium-High
Concrete/Straw/Paper	\$\$\$	Medium	Clean	Medium	Low-Medium	High
Concrete/Sand	\$\$	High	Clean	Low	Low	Low

CS* - chopped straw

Adapted from: OMAFRA Factsheet 'Alternative Bedding Systems' by Harold House. 1993

ANOTHER COW COMFORT CONCERN: TINGLE VOLTAGE

Tingle or stray voltage, which is an electrical current in cow stalls or the milking parlour, on farms is another problem on farms that affects cow comfort and should not be present in housing areas of calves, heifers or cows. The greatest impact is seen on milking animals where the voltage leads to uneven milkout, nervous milkers, or cows that do not want to enter the parlour. When cows are nervous, they do not stand still as well and it is harder to keep milkers on them. This results in more cases of clinical mastitis and higher somatic cell counts. Normal housing always has some voltage present but it can be reduced by filtering. An electrician can help you find the problem and reduce its impact.

The Calf 'House'

Listed below are several features of ideal calf housing:

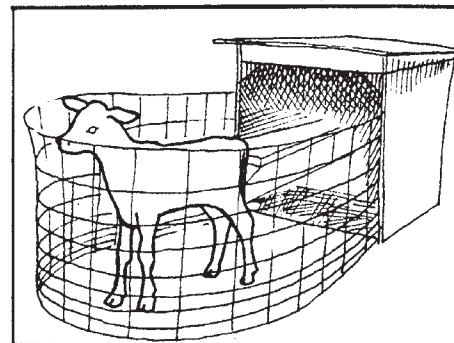
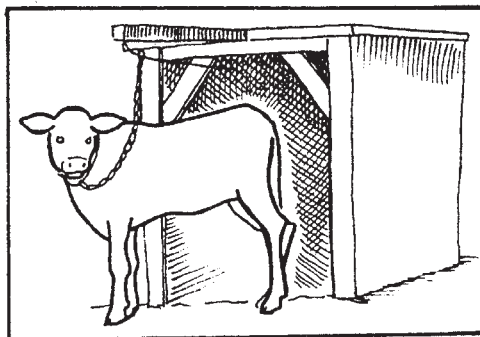
1. **Easy to clean** - Keeping calves clean is a big priority because dirty calves often get sick. Many diseases spread through manure. When older calves move out and younger calves move in, the facility should be cleaned out, disinfected, and rebedded.
2. **Low cost** - Keeping the budget for housing facilities low will ensure that more money is available to feed and take care of the calves properly.
3. **Flexible** - At certain times during the year you will probably have more calves than you will at other times. Calf housing should be able to adapt to changes in the number of animals it needs to accommodate, as well as changes in the seasons.
4. **Well-ventilated** - Fresh air that is not damp or drafty is very important in raising healthy calves.
5. **Individual** - Calves being fed a liquid diet from birth to two months of age should usually be kept separately, with no physical contact from or with any other animal, this prevents the spread of disease. Each calf needs approximately 1.2 m x 2.4 m of her own space to thrive.
6. **Dry** - Wet calves get sick so it is very important to keep them dry and well-bedded.
7. **Convenient to Work In** - The design of the housing should allow the farmer to feed and clean the calves easily. Young calves require a lot of care so they should not be located too far away from where their feed is prepared.
8. **Easy to observe** - The housing should be in an area that you can watch easily so that you are more likely to notice problems during early stages.

COLD ENVIRONMENT VS. WARM ENVIRONMENT

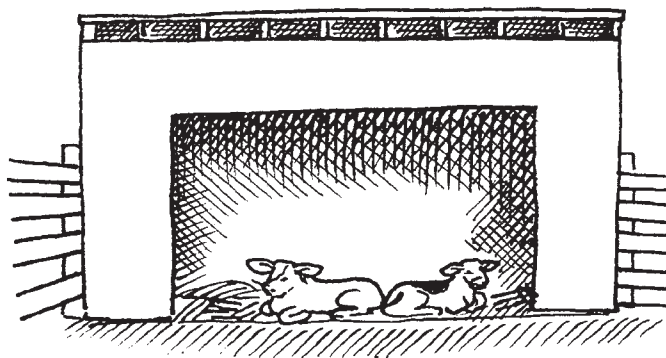
There are two main types of calf housing that farmers can choose from: cold and warm.

Cold Calf Environment – Calves do not need to be kept as warm as people do, which allows them to live in cold temperatures. Cold housing is naturally ventilated, which saves money because there are no heating costs; however, colder calves tend to be hungrier and eat more.

Examples of cold environments are hutches, monoslope barns and gable roofed barns. Hutches are made of plywood, plastic or fiberglass and placed outside. Calves can even be placed in hutches when it is very cold

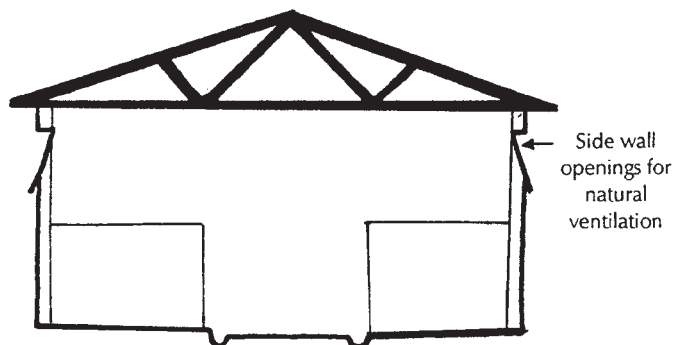


outside, as long as their bodies have not adapted to the warm climate inside the barn where they were born. Hutches are usually 1.2 m x 2.4 m in size. Underneath a calf hutch, you must put a layer of sand, gravel or stone that can be used for drainage. Straw and/or shavings can then be used as a top layer to make a dry and comfortable bed.



A calf hutch is like a little house that a young calf gets all to herself! Hutches often have places for water, grain and milk containers. Some hutches allow the calf to run in and out for exercise; other hutches allow the calf to run around inside the hutch only, but it can stick its head out of the opening. In the hot summer hutches should be placed in shady areas because they can act like greenhouses and get very hot. In the winter, the hutch must be oriented in a way that the wind and snow do not blow on a calf.

Monoslope are barns that have roofs that slope in only one direction and have an open side to let calves run in and outside.

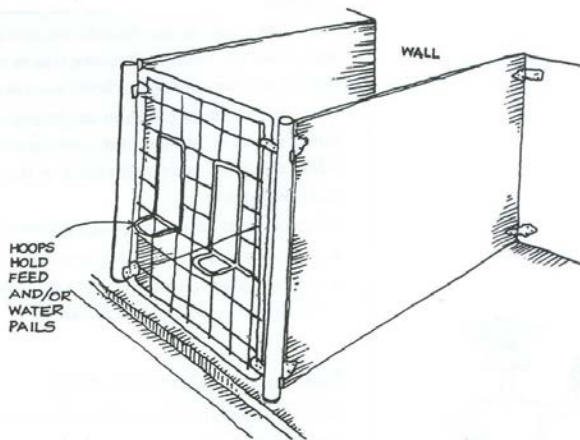


Gable roofed barns have side openings for natural ventilation.

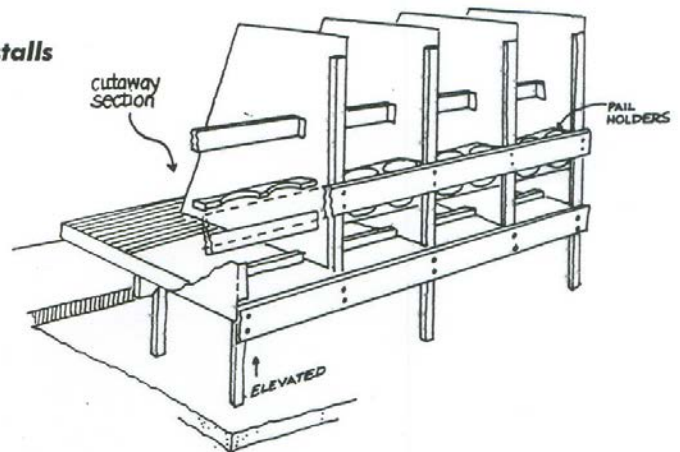
Warm Calf Environment - These are heated barns with mechanical ventilation systems. The temperature inside should be 10°C with less than 80% humidity. Since people like warm temperatures, warm calf houses are more comfortable for the dairy farmer to work in.

Warm calf environments often have calf stalls because stalls take up less space so there are more calves heated for the same amount of money. They should be made of solid sides about 1.3m high. The floor space should be 0.9m x 1.80m. Calves could be loose or tied in a stall.

Calf pens



Calf stalls



Alternative Pen Types for Cold or Warm Housing

Calf pens can be set up inside a building. The building should be well-ventilated and separate from adult cows. Individual pens should be at least 1.2 m x 2.4 m. They should have three solid sides and an open front. The open front will make it easier to observe and feed the calf, and will improve ventilation. These pens can be constructed out of wood and made in a way that they can be taken apart and stored when they are not needed. They are also easy to clean.

Group housing is an option that some farmers choose in order to cut down on the amount of space and time needed to care for calves. When in group housing, calves should still have at least 1.2 m x 2.4 m of space each. This method of housing makes it easier for diseases to spread from one calf to another as calves are also able to suck on each other, which could lead to infections of the navel or future udder problems. The advent of feeding unlimited acidified milk is making group housing preferable for some people. Since unlimited feeding allows calves to drink milk instead of sucking on each other, the sucking problem is minimized; however, sick calves should be removed from the group to prevent the spread of disease.

Did you know?

If you're feeding calves housed in a cold environment, you need to feed them 10-20% more than calves in warm calf housing. This means that you must feed cold environment calves 11-12% of their body weight each day; you should also feed them 3 times a day instead of twice. Eating more at once means a greater chance of scours. Splitting up the amounts over 3 meals will help prevent this from happening.

COMPARING COMMON TYPES OF CALF HOUSING

Factors	Hutch	Cold Calf Barn	Warm Calf Barn
Easy to clean	<ul style="list-style-type: none"> • Yes 	<ul style="list-style-type: none"> • If designed properly. 	<ul style="list-style-type: none"> • If designed property.
Low cost	<ul style="list-style-type: none"> • Cheap to build and maintain. • Spend more on winter feeding. 	<ul style="list-style-type: none"> • More expensive than hutches, but still economical. • Spend more on winter feeding. 	<ul style="list-style-type: none"> • Most expensive due to heating and building costs. • Feeding costs the same all year.
Flexible	<ul style="list-style-type: none"> • Can be moved anywhere on farm and stored when not in use. 	<ul style="list-style-type: none"> • If designed properly. 	<ul style="list-style-type: none"> • If designed properly.
Well-ventilated	<ul style="list-style-type: none"> • Yes, uses natural ventilation. 	<ul style="list-style-type: none"> • Yes, if designed properly. 	<ul style="list-style-type: none"> • Harder to keep well-ventilated due to mechanical ventilation.
Individual	<ul style="list-style-type: none"> • Eliminates calf-to-calf contact. 	<ul style="list-style-type: none"> • Eliminates calf-to-calf contact, depending on design. 	<ul style="list-style-type: none"> • Eliminates calf-to-calf contact, depending on design.
Dry	<ul style="list-style-type: none"> • Yes, if well built. 	<ul style="list-style-type: none"> • Yes, if well built. 	<ul style="list-style-type: none"> • Sometimes humidity gets too high.
Convenient to work in	<ul style="list-style-type: none"> • Farmer exposed to weather during feeding (snow, rain, etc). • Water freezes in winter. 	<ul style="list-style-type: none"> • Protected from weather, but the temperature is the same as outside. • Water freezes in winter. 	<ul style="list-style-type: none"> • Warm for farmer. • Less labour thawing water and feeding cold calves.
Easy to observe	<ul style="list-style-type: none"> • Yes, in the right location. 	<ul style="list-style-type: none"> • Yes, in the right location. 	<ul style="list-style-type: none"> • Yes, in the right location.

MOVING ON...IT'S TIME FOR HEIFER HOUSING

When a heifer is two to three months old, she needs to be weaned and moved from her 'calf house' to heifer housing. This transition involves a change in physical surroundings, feed and social environment. There are a few things you can do to make the adjustment easier:

- Move calves in small groups of three or four 'friends' (animals that are about the same age and size).
- Minimize the change in surroundings, such as moving from a hutch to a super hutch with more animals.
- Make sure they are able to eat grain and hay when they change locations.

A Heifer's New Home

Heifer housing should have the following features:

1. **Separation** - Group by age and size and keep dry cows and heifers separate.
2. **Easy movement** - As heifers get older or bigger they need to be able to move into the next age or size grouping area.
3. **Easy observation** - You must be able to watch heifers for health disorders, eating problems and signs of estrous (heat).
4. **Feed bunks** - Ensure they are suitable for the height and size of the heifers.
5. **Areas for treatment and breeding** - Heifers need to be vaccinated, treated when they are sick and bred when they are ready. Self-locking headgates or other means of confinement may be necessary to be able to hold the heifers in these instances.
6. **Easy removal of manure and bedding** - Necessary so that heifers are kept clean and dry, which allows them to remain healthy.
7. **Available water.**
8. **Natural ventilation.**
9. **Space for exercise.**

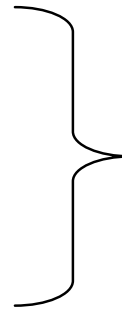
Grouping Heifers

Why not with the dry cows? Heifers and dry cows are often housed in the same building, which is fine. They do need to be located in separate pens or pastures though. There are a few reasons why they should be kept separate:

- Heifers and dry cows need to eat different rations.
- Heifers should not be exposed to older cows because they have not had time build up resistances to all of the same diseases.
- Older cows are bigger and stronger. They can take over watering and feeding areas and prevent the heifers from eating and drinking enough.

Heifers should be grouped according to size and age for the same reasons that they need to be grouped differently from the dry cows. An ideal method of grouping would involve assembling animals that are no more than 3 months apart in age:

- Group 1: 0-3 months
- Group 2: 3-6 months
- Group 3: 6-9 months
- Group 4: 9-12 months
- Group 5: 12-15 months
- Group 6: 15-18 months
- Group 7: 18-21 months
- Group 8: 21 months to calving



These groups could be grouped differently and some may be combined if you have a small herd.

Heifers Need Their Space . . . Just Like You!

Imagine if you had to share a room with your entire family. It would feel quite crowded and would not be very fun at all. Heifers require adequate space just like you do.

The chart below shows the amount of space heifers need when they are different sizes.

Space Heifers Require

	1	2	3	4		
					Free Stall Neck Location	
Weight (kg)	Manger Space (cm)	Depth of Feeding Area (m)	Bedded Pack Area (sq.m)	Dimensions (cm x cm)	cm from rear curb	cm above stall base
75	30.5	1.8	0.9	61 x 117	86	71
150	35.6	2.1	1.4	69 x 130	94	84
200	38.1	2.3	1.8	76 x 142	104	89
300	44.5	2.5	2.3	89 x 165	122	99
400	48.4	2.9	2.8	97 x 183	135	107
500	54.6	3.3	3.3	109 x 203	150	112
600	61.0	3.7	3.7	122 x 229	168	117

To figure out how much space per animal you need for each type of heifer housing, use the following formula and the numbers from the top of the columns on the above table:

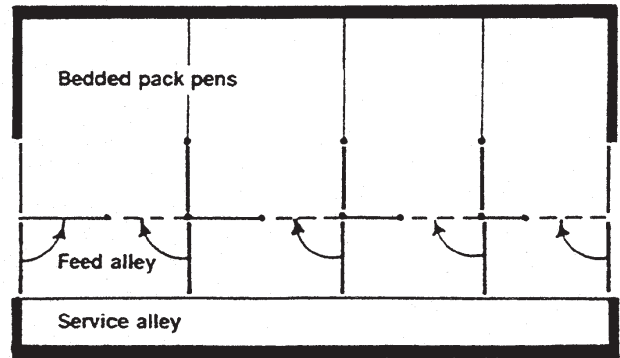
Area needed for loose housing = 1 x 2 + 3

Area needed for free stalls = 1 x 2 + 4

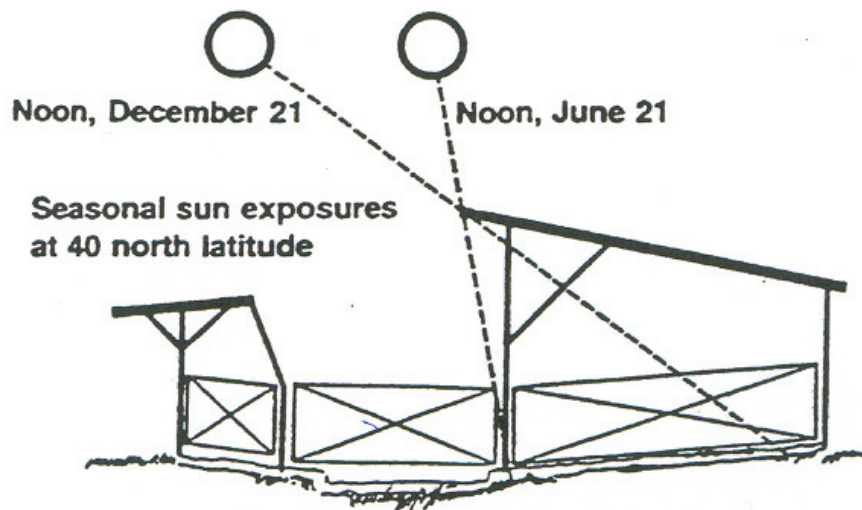
Sample Heifer Housing

A gated bedded pack barn is like a free stall barn but instead of stalls, there are bedded pens. They allow flexibility regarding the size of the animal that can be put in each pen. Animals need about 2.8-4.5 square metres of bedding, depending on their size, so they do require more straw, sand or shavings than in a free stall housing. If the barn is designed well it could be remodeled into a free stall barn later.

Open front housing is a good transition type of housing for animals that have been kept in calf hutches. The open front faces south to maximize sunlight and minimize cold winds. The single sloping roof minimizes the amount of sunlight that can get in the summer. A scrape alley and open building can easily be cleaned out with a tractor. Heifers and dry cows of different ages can be separated by dividers.



Open front housing



MILKING COW HOUSING

The dairy industry is continually focusing more and more on cow comfort to increase profitability on dairy farms. Cow housing and milking systems are primary focuses on many dairy farms. More focus is usually placed on the comfort of the milking herd than the rest of the herd because it has a more obvious and direct impact on milk production and productivity.

It is very important that the feed and water systems, ventilation, manure removal, stall base and bedding of animals is optimal and increases comfort in order to maximize productivity and animal health.

The Ultimate Way to Judge Cow Comfort

Go into the barn during a quiet time of the day (not feeding or milking time). How many cows are lying down? How many cows are chewing their cud? These behaviours will indicate that cows are comfortable. Remember: comfortable cows make more milk!

Housing cows in inadequate facilities can lead to lost milk production, dirtier cows with increased risk of mastitis and other disorders and cows defecating in areas that are difficult to keep clean. While cows cannot tell you when they are comfortable or uncomfortable, there are many signs to watch for that will tell you if your cows are happy in their physical environment:

- **Idle standing** - Such behaviour, when a cow is not eating, resting or going somewhere, may indicate that a cow is lame or has a hard stall surface that she does not want to lay down on.
- **Perching** - Is when a cow stands with her front legs in the stall and her rear legs in the alley or lying down partially in the stall and partially in the alley. This behaviour is usually a sign of a cow that does not like how she is tied up, that there is a lack of headspace, that neck rails are in a poor location, that the stall that is too short or uncomfortable, or that they are lame.
- **Diagonal standing or lying** - When a cow is diagonal in her stall it usually means that there is not enough space for her to stand, lie or lunge in a straight direction. In tie stalls, it could also mean that the opening at the front of the stall is narrow, the manger curb is too high or that she does not like the location of the tie rail or electric cow trainer.
- **Lying backwards** - When free stall cows lie backwards in stalls it usually means they are turning away from something they dislike and turning towards the open space for easier movement. For example, if there is a wall very close to the front of the stall (with not enough lunge space), cows may turn backwards.
- **Restlessness or long periods of lying** - These behaviours describe cows that change position while lying down or fidgeting. The result is often chafed hocks from the movement of their legs against the stall. The cause may be high curbs that prevent front legs from moving forward, injuries or lameness.
- **Alternate occupancy** - Occurs when cows in free stall barns situate themselves in nose-to-nose stalls so that the stall facing them is empty. This occupancy allows animals to avoid facing dominant cows and to have sufficient lunge and social space. It may also mean that the stalls are too short for the cows.

Lying Down on the Job!

50% more blood flows to the cow's udder when she is lying down. Since it takes 454kg of blood flowing through her udder to make 1kg of milk – a cow that is comfortable lying down can make more milk!

- **Bunching** - Occurs when free stall cows stand in one area and avoid another location. This could mean that there are variations in air movement and temperature in the barn, or that some stalls are more comfortable than others.
- **Rising and lying motions** - These movements should be continuous and smooth. When a cow rises, her body lunges forward and her head bobs up and down to counterbalance the rising of her hindquarters. During the rising process, her shoulders move forward about 16 inches and her head moves forward about 24 inches. Any obstruction that limits her movement will cause her to move differently when rising.
- **Caudal licking (grooming)** - Occurs when cows groom the fold between their udder and their leg. Hygiene is important between the leg and the udder as it can prevent scalding in that area. When cows are unable to perform this behaviour, it is a sign that the floor is too slippery.
- **Kneeling Cow Syndrome (KCS)** - KCS describes cows that stand upright on their hind legs and down on their front knees. This could happen for a variety of reasons: when cows are eating below or at the same level as their feet (the manger should be slightly raised); cows could be trying to avoid poorly positioned electric trainers or neck rails; there may be obstructions to rising; cows with laminitis may also exhibit this behaviour.
- **Dog sitting** - When a cow sits like a dog, with her hindquarters down on the ground and her front legs extended it may mean that she has an injured front leg or that she does not have adequate lunge space to rise normally.
- **Nose-pressing** - This behaviour, when a cow pushes her nose into a pole or steel rail, is also called "stereotypy". It is a response to a stressful condition. The cause could be hard to identify and is often related to stall dimensions and the amount of space available for the cow.

HOUSING DESIGN

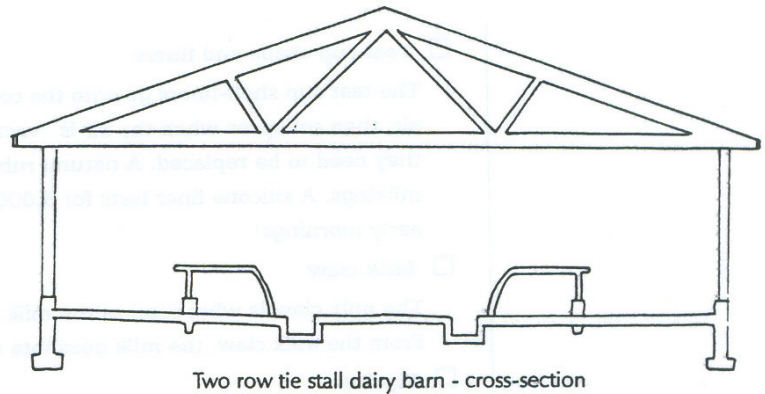
The three main types of housing for dairy cattle in Canada are tie stalls, free stalls and pack barns. Generally, farms with less than 50 cows use tie stalls and those with more than 100 cows use free stalls. Farmers milking between 50 and 100 cows have especially careful decisions to make about what system to use. Pack barns are newer and as such, there are fewer in existence. In the end, the type of housing usually depends on the farmer's preference, cost and the amount of labour involved.

In both free stall and tie stall housing, the stalls must be designed with animal comfort and health in mind. There are a couple of features that must be considered regardless of what housing method is used:

- **Partitions** - The dividers between stalls should be wide enough apart for the animals to get up and down freely. Lunge space should also be provided. Dividers encourage cows to lie straight, keeping the area cleaner. Dividers with posts that extend back into the platform the cow stands on can allow the cows' legs to get caught. Suspended or flexible dividers are more suitable.
- **Stall size** - Must be adequate for comfortable resting positions and adequate lunge space for rising.
- **Slope** - A downward slope to the back of the stall allows the stall to drain towards the gutter or scrape alley, and ultimately keeps the stall cleaner.
- **Freedom from obstructions** - These are detrimental to optimal cow comfort as they prevent lunging and other normal behaviour.

Tie Stall Housing

'Tie stall' means that each cow is tied inside a stall and is not constantly roaming around. Instead of having to walk around to seek feed, water, milking and resting areas, everything that the cow needs is brought to her. Cows are often let outside for exercise. This is the traditional type of housing that was used on dairy farms in the past and is still very popular for herds that milk less than 60 cows.



Two row tie stall dairy barn - cross-section

There are some important stall features to consider when constructing tie stalls:

- Traditional comfort or stanchion stalls do not allow cows to lunge forward in their natural manner when they are getting up. Single head rails with a chain (that reach the height of the manger curb) and a neck strap allow each cow to get up and down in a way that is the most natural.
- Tie rail (head rail) height should be adjusted as in the chart below.
- The stall opening should be large enough to allow sufficient lunge space and to allow the animal to back up and turn out of her stall when she is leaving.
- Manger curbs should be added to keep bedding out of the feed, and vice versa.
- Manger height should be four inches above the cows' feet to reduce pressure on her feet.
- The bed should have adequate dimensions (as in chart below) and cushion.
- Water bowls should be placed in a manner that provides easy access to them without obstruction.
- Cow trainers are helpful in keeping animals clean but should be located 2-5 inches above the cows' backs, approximately 6 inches behind the point of shoulder. If they are not properly installed they can cause nervousness, teat injuries, accidents and reduce reproductive performance. They must be at least two inches above the cow's back and do not need to be left on all the time.
- The dimensions should be large enough to enhance cow comfort:

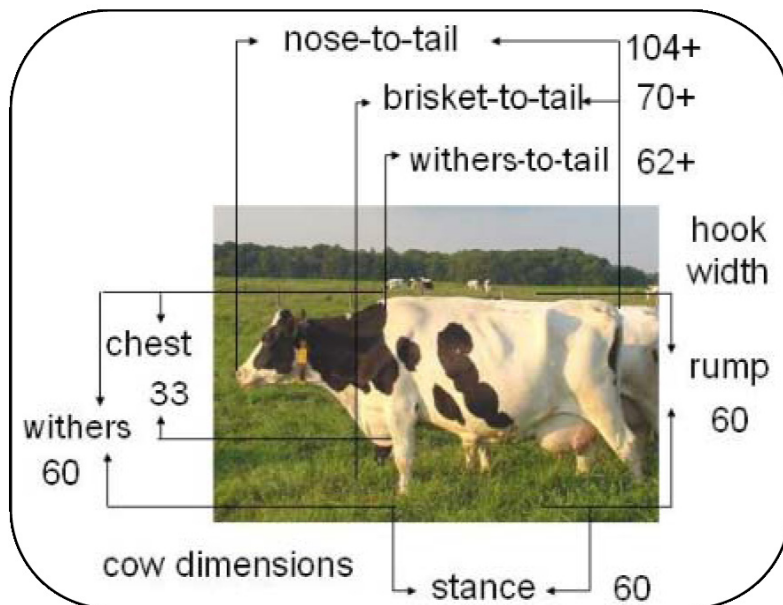
Stall Dimension	Ratio and Reference Body Dimension	An Example a median cow
Bed length = imprint length	1.2 x rump height	1.2 x 60 = 72 in.
Tie rail height above cow's feet	0.80 x rump height	0.80 x 60 = 48 in.
*Stall width = imprint width +	2.0 x hook-bone width	2 x 26 = 52 in.

* Producers are building most new tie stalls wider than this minimum width. The most common minimum width is 54 inches.

The measurements for both tie stall and free stall barns are based on the cow body dimensions below:

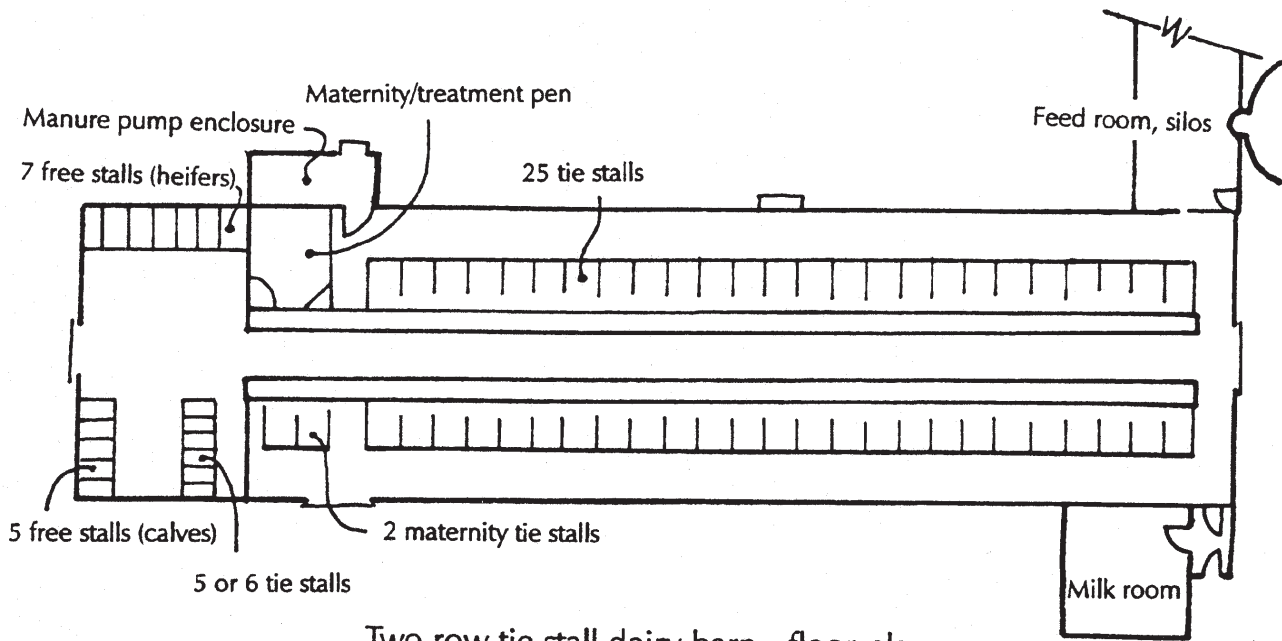
Body Dimension	Inches	Proportions
Nose-to-tail length	102 (range 96-110)	1.6 x rump height
Imprint length – resting	72 (68-76)	1.2 x rump height
Imprint width	52	2 x hook-bone width
Forward lunge space	24	0.4 x rump height
Stride length when rising	18	0.3 x rump height
Rump height – mature	Median 60 (range 58-64)	
Rump height – Lactation 1	Median 58, top 25% - 59	
Stance – front-to-rear feet	60 (range 58-64)	1.0 x rump height
Withers (shoulder) height	60 (range 58-64)	1.0 x rump height
Hook-bone width	26 (range 24-27)	

Source: 'Free Stall Dimensions', OMAFRA INFOSheet, Neil Anderson, 2007



Cow Dimensions

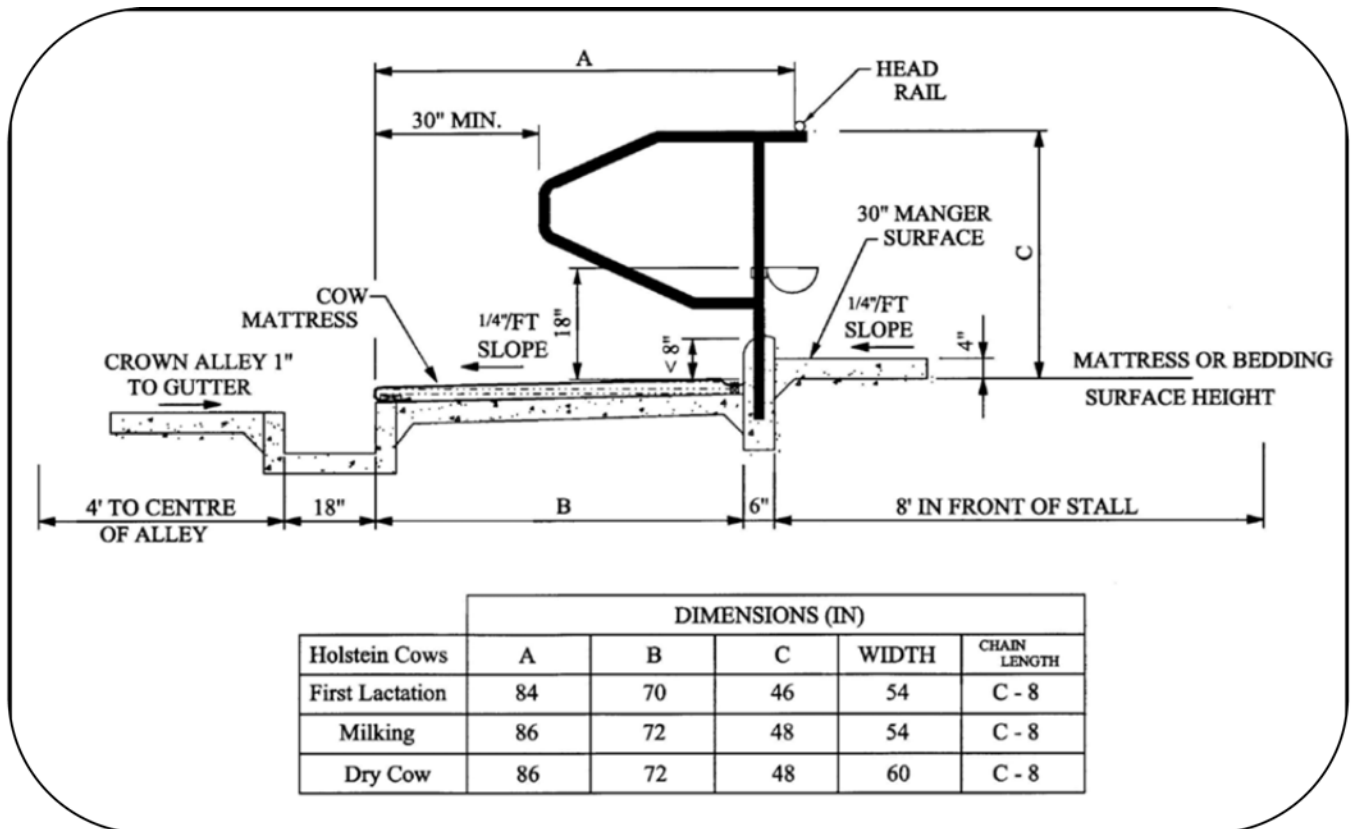
Source: "Free Stall Dimensions", OMAFRA INFOSheet, Neil Anderson. 2007.



Two row tie stall dairy barn - floor plan

Sample Tie Stall Layout

A tie stall with proper slope and dimensions will help maximize milk production and improve reproductive performance and overall cow health. Reference the samples of such a set-up below:

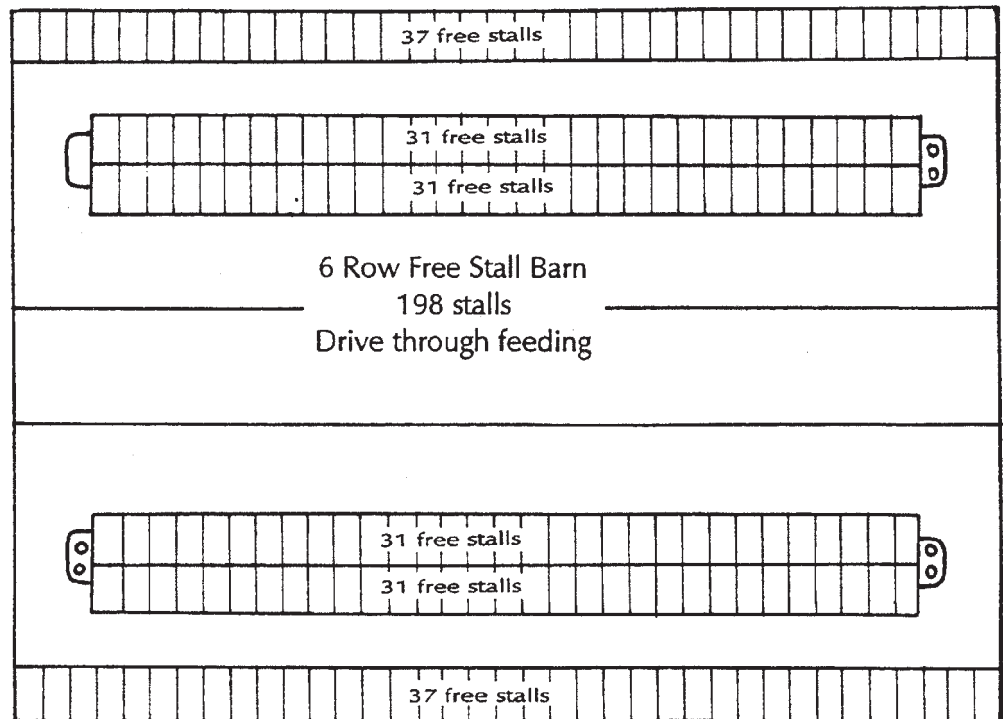


Source: "Tie Stall Dimensions"; OMAFRA INFOsheet, Neil Anderson. 2007 (Diagram courtesy of Harold House, OMAFRA)

Free Stall Housing

'Free stall' means that cows roam freely through the barn. It is one form of **loose housing**. There are separate areas for eating, drinking, resting, and milking. Milking is done in a parlour, or by a Voluntary Milking System (robot). The free stalls are where the animals rest. There are several features to pay attention to when building free stall barns to make sure that the stalls are adequate for the cows:

- The neck rail needs to be properly located to allow cows to stand up straight and to lunge forward when rising.
- The partitions between the stalls must have wide loop openings at a proper height so that cows are able to lunge diagonally through them when rising, if they so choose.
- Brisket locators are important to keep the cows from moving too far forward in the stalls, but they should not be so high that they limit the cow's ability to swing her front legs forward when resting.
- The front area of the stall should not have any objects that obstruct the cows' ability to rest or lunge forward when rising.
- Deterrent straps or pipes may be necessary to prevent cows from exiting from the front of the stall.
- Some measurements may change, depending on the type of base and bedding used in the stalls.
- Just like in tie stall barns, cow dimensions should be considered to maximize cow comfort in stalls:



Source: "Free Stall Dimensions" OMAFRA INFOsheet, Neil Anderson, 2007.

Stall Dimension	Ratio and Reference Body Dimension	An Example a median cow
Stall length from curb to solid front	2.0 x rump height	2.0 x 60 = 120 in.
Stall length for open front head-to-head	1.8 x rump height	1.8 x 60 = 108 in.
Bed length = imprint length	1.2 x rump height	1.2 x 60 = 72 in.
Neck-rail height above cow's feet	0.83 x rump height	0.83 x 60 = 50 in.
Neck-rail forward location = bed length-2	(1.2 x rump height)-2	(1.2 x 60)-2 = 70 in.
Deterrent strap in open-front stalls – 18-ft.	0.6 x rump height	0.6 x 60 = 36 in.
Deterrent strap in open-front stalls – 16-ft.	0.7 x rump height	0.7 x 60 = 42 in.
Stall width – loops on centres	2.0 x hook-bone width	2.0 x 25 = 50 in.
Space between brisket locator and loop	foot width	5 inches

Pack Barn Housing

'Pack barns' do not contain any individual cow stalls. They are similar to free stall barns because cows roam around freely, another form of loose housing, with separate areas for eating, drinking, resting, and milking. Instead of resting in a stall, animals rest on a large bedding pack that is big enough to hold a large group of cows. These packs are often made of sand. Compost packs are becoming increasingly popular. Such beds involve an accumulation of manure that continually has bedding added to it so the cows remain clean and dry.

There are advantages and disadvantages to the different types of barns used for dairy cattle housing:

Type of Housing	Advantages	Disadvantages
<p>Tie Stall Housing (with pipeline)</p>	<ul style="list-style-type: none"> • More time spent with each cow. • Animals get individual attention. • Low installation cost for milking system. • Easier to treat sick animals since they are already tied up. 	<ul style="list-style-type: none"> • Cows do not get as much exercise. • One person can milk fewer cows per hour than in a parlour. • Heat detection more difficult. • More labour taking feed and equipment to cows.
<p>Free Stall Housing (with parlour)</p>	<ul style="list-style-type: none"> • Lower amount of labour per cow. • Parlour can milk 60-120 cows per hour, depending on design. • Cows get adequate exercise. 	<ul style="list-style-type: none"> • Less time spent with each animal. • Less individual attention. • More expensive to install milking system. • If a parlour is used to milk, clean up takes about 30 minutes longer than tie stall.
<p>Pack Barn Housing</p>	<ul style="list-style-type: none"> • Lower amount of labour per cow than tie stall. • Parlour can milk 60-120 cows per hour, depending on design. • While the milking system is expensive, it is less costly than free stall because stall work is unnecessary – housing is simple and relatively inexpensive. • Cows get adequate exercise. • Very comfortable. 	<ul style="list-style-type: none"> • Manure must be picked regularly from the pack to keep it clean, and pack must be aerated if composted. • Less individual attention. • More expensive to install milking system. • If a parlour is used to milk, cleanup takes longer than in a tie stall. • A composting pack needs bacteria, but cow udders don't! • More space per animal is needed.

MILKING SYSTEMS

Choosing a milking system goes hand-in-hand with choosing a type of housing; the two decisions are usually made together.

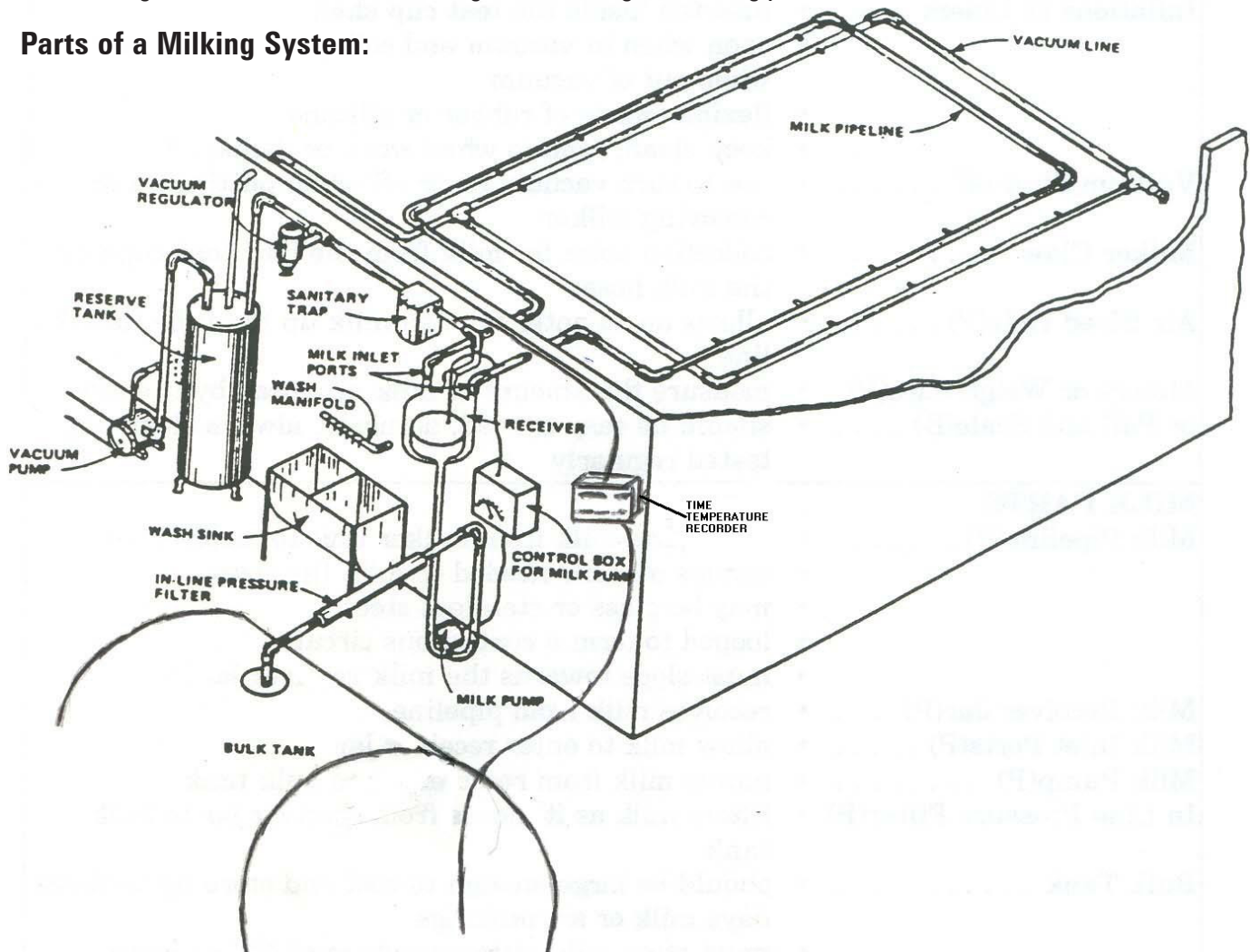
There are three main types of milking systems:

1. **In-barn pipeline** - Used in tie stall barns only.
2. **Parlour** - Used primarily in free stall and pack barns; could be used in a tie stall barn if cows leave their stalls to be milked in the parlour.
3. **Automatic Milking System (AMS)/Voluntary Milking System (VMS)/Robotic Milker** - Used in free stall or pack barns.

The purpose of all milking systems is the same:

1. Get milk to flow out of the teat.
2. Massage the teat so that it does not get sore during the milking process.

Parts of a Milking System:



Name of Part	What Job Does It Do?
Vacuum parts (pump, hoses, regulator)	Control the amount of air and vacuum in the milking system.
Pulsator Automatic take-off (option)	Creates and controls the milking cow cycle electrically. The cycle is air-vacuum-air-vacuum. It is like sucking on a straw. When you suck on it, you create a vacuum; when you stop, air is let in. If equipped with an automatic take-off option, the take-off unit will turn off the unit and remove it automatically from the cow, when the milk flow stops.
Teat cup shells and liners	The shells are stainless steel and inside them are the rubber or silicone liners. The liners go onto the cow's teats. They inflate with air and then collapse during the vacuum part of the milk cycle. Rubber liners must be replaced every 500-700 milkings and silicone ones every 5,000 to 10,000 milkings.
Milk Claw	Catches the milk after it is sucked from the udder. Milk goes from here into a hose that reaches the pipeline.
Pipeline	Carries the milk from the claw into the receiver jar and from the receiver jar into the bulk tank. It is very short in parlours but if cows are milked in a tie stall barn, the pipeline is long enough to run over top of all of the cow stalls and back into the milk house. It is like a long plastic or stainless steel hose that carries milk and is easy to clean. They are sloped towards the milk house so that milk can flow by gravity.
Receiver Jar	Milk comes into the receiver jar from the pipeline and is held here until there is enough milk to be mechanically pumped through a short pipeline into the bulk tank
Bulk Tank	The large 'refrigerator' that holds and agitates the milk after milking. It cools and keeps the milk between 1°C and 4°C until the milk truck comes to pick it up.
Time Temperature Recorder (TTR)	A monitor that keeps track of pipeline and bulk tank temperatures, milking and wash times. It alarms producers, bulk tank milk graders and milk inspectors about problems in milking, cooling and washing cycles.

Note: There are many parts of a milking system and some equipment varies from farm to farm. This chart outlines the major components of typical systems.

Keeping the System Clean

All milking systems must be kept very clean to avoid contamination of the milk. All parts of the milking system that milk comes into contact with must be washed every day. Washing milking equipment is like running the system through a dishwasher with several cycles.

Steps to Washing:

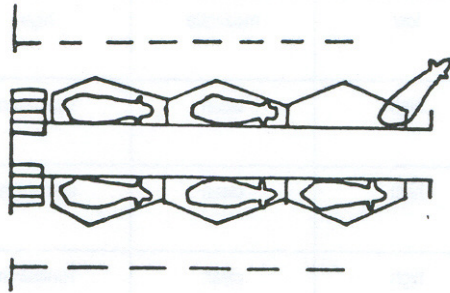
1. Warm water rinse to remove any debris and excess leftover milk from the system.
2. Alkaline chlorine based detergent wash to remove dirt and residues.
3. Acid rinse to remove residues left after washing.
4. Sanitizer rinse just before the next milking to kill any leftover germs.

Milk houses and parlours must also be rinsed to ensure that they are kept clean as well.

TYPES OF PARLOURS

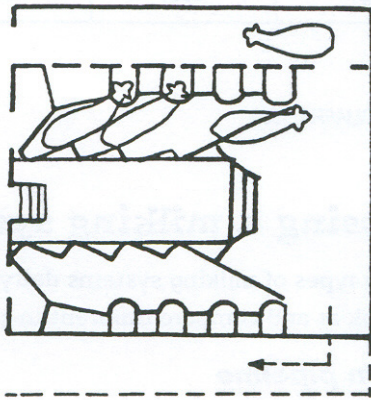
While in-barn pipeline systems are very straightforward - a pipe that carries the milk runs around the barn, alongside a pipe that holds the vacuum - there are several parlour designs that farmers can choose from. These include side opening (double and single), herringbone (polygon, double and single), rotary platform and parallel. The most common types in Canada are the double side opening, double herringbone, and parallel designs.

Double Side Opening



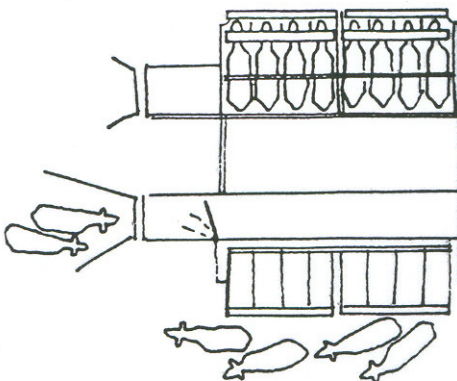
Animals stand nose-to-tail in this type of parlour. The operator must walk the length of an animal to get to each udder, so more time is spent walking in this system than in other systems. Each cow has her own door to exit through so as soon as she is finished, her door opens and she leaves so that another cow can enter to be milked. Thus, an advantage is that a slow milking cow does not hold up the entire parlour.

Double Herringbone



The operator needs to walk less distance from one animal to the next because the cows are standing on an angle to the parlour pit. More cows can be milked per hour because walking time is reduced and more cows can fit into the parlour at once. There are disadvantages though. The cows are milked in groups, so all cows in the group must be finished milking before any of them can exit the parlour. The cows enter at one end and exit at the other, so there is some time delay as the cows must leave in single file and the next group of cows must enter in single file. In *rapid exit herringbone parlours*, the side of the stalls furthest from the parlour pit lifts up like a garage door so that and the cows can turn around and leave at the same time, thus reducing the time required for milking from that of a regular herringbone parlour.

Parallel Parlour



The cows stand perpendicular to the parlour pit, so the shortest amount of time is needed to move from cow to cow. Milkers are attached to cows from behind, between their rear legs; this is unlike in-barn pipeline, herringbone and side opening parlours where the milkers are attached from the side of the cow. There is less chance of the operator being kicked or of the cow kicking the milker off; however, the operator needs to guard against defecation. The cows are milked in groups, so slow milking cows hold up the entire group. Most of these parlours have a rapid exit design so that the transition time is minimized between groups of cows.

Rotary Parlour

Cows stand on a rotating circular platform, past a stationary central pit. Typically, animals walk from a holding area into a stall – the stall is part of a circular steel platform with stalls arranged all around the circumference. When a cow stands in a stall, her head faces towards the inside of the circle. Once a cow stands in a stall, the circular wheel rotates a few feet until the cow is situated in front of the operator. The milking claw can be placed on the cow and the platform can then be rotated another few feet, so that the milking claw can be placed on the next cow. When a cow is finished milking, an automatic take-off removes her milking claw and she can exit when her part of the circle comes around to the exit gate. Old rotary parlours suffered from high maintenance costs. While the ‘bugs’ have been worked out in new models, rotary parlours are still the most expensive parlour option. They are designed for producers milking 300 or more cows and are appealing because a lot of cows can be milked in a short period of time.

A comparison of some common milking parlours:

System	Number of Milking Stalls	Milking Units	Cows Milked per Hour
Automated 2 x 4 side opening	8	8	60
2 x 8 standard exit double herringbone	16	16	70
2 x 8 rapid exit parallel	16	16	80
2 x 12 rapid exit parallel*	24	24	120

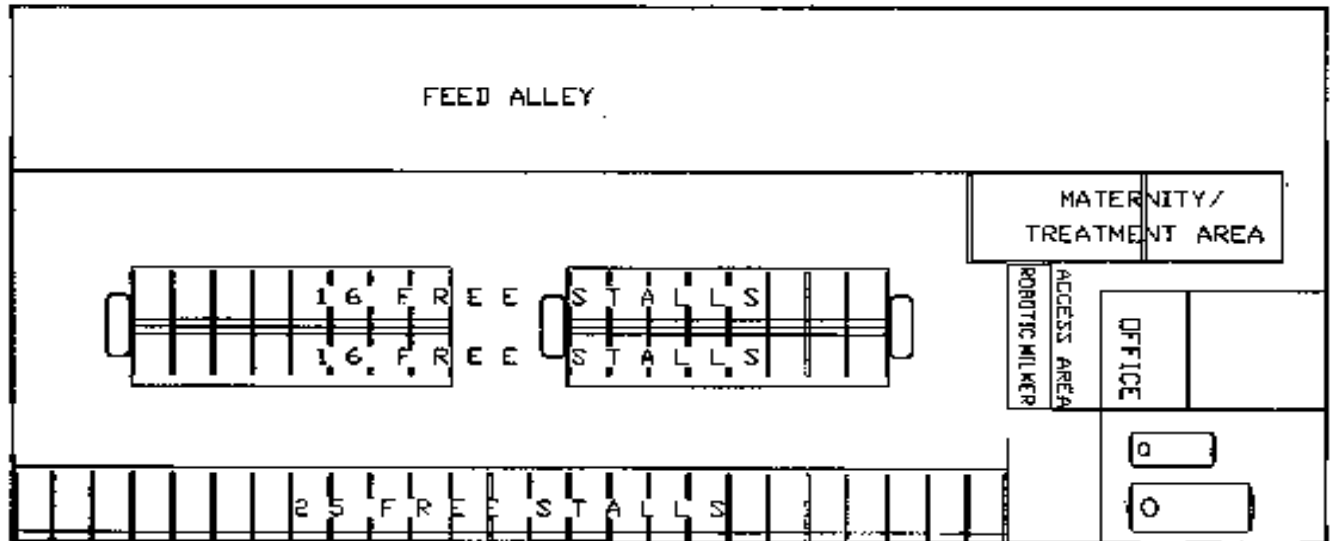
* This is the only parlour (excluding rotary) that keeps the operator busy, making the best use of labour. In a 100 cow herd, a parlour of this size would only be used 10% of the time as these parlours are designed for larger herds of up to 700 cows being milked three times a day.

AUTOMATIC MILKING SYSTEMS

Automatic Milking Systems (AMS) or Voluntary Milking Systems (VMS) are more commonly known as *robotic milkers*. They have been used since 1992, with most of the units being installed in Europe, particularly the Netherlands. These systems are primarily used in herds between 100 and 150 cows. They are becoming more popular for one-man operations because one person can care for 65 cows with minimal additional labour. When cattle numbers get larger (> 120) the animals need to be arranged into smaller groupings, or more robotic milkers need to be installed.

There are a few reasons why some people have decided to adopt this technology. From the cow’s perspective, this system allows her to move freely, not just when eating, drinking and resting but also when milking. This allows the animals to act naturally. From the perspective of the farmer, AMS milking enables more flexibility in scheduling, reduces the financial and mental stress of hiring labour, and allows other aspects of management to receive more attention.

There have been several drawbacks related to AMS as well. Some farmers have experienced increases in somatic cell and bacteria counts. Reasons for this may be poor bulk tank washing, uncleaned hoses attached to a second robot that is not used, frequent washing of the system that results in some water being left inside equipment. Arranging cow traffic must also be arranged to allow all animals access to the robot and eliminate confusion. Robotic systems do not tolerate freezing temperatures and as such, at least some of the equipment, must be in a heated, confined area. Animals must also be trained to adapt to this system, which could take two or three weeks.




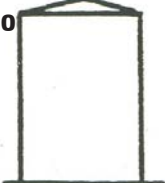
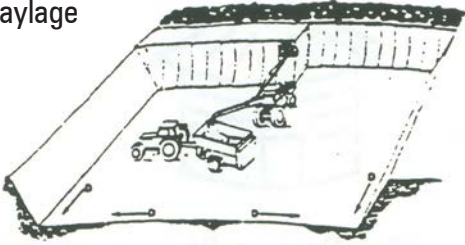

A basic three-row freestall barn set up with one robotic milking unit. The robotic milker is set up near the office for easy heating and transfer of electronic information on individual cow milkings from the milking unit to the office computer.

Source: OMAFRA Factsheet 'Housing Considerations for Automated Milking Systems' by Harold House. 2001

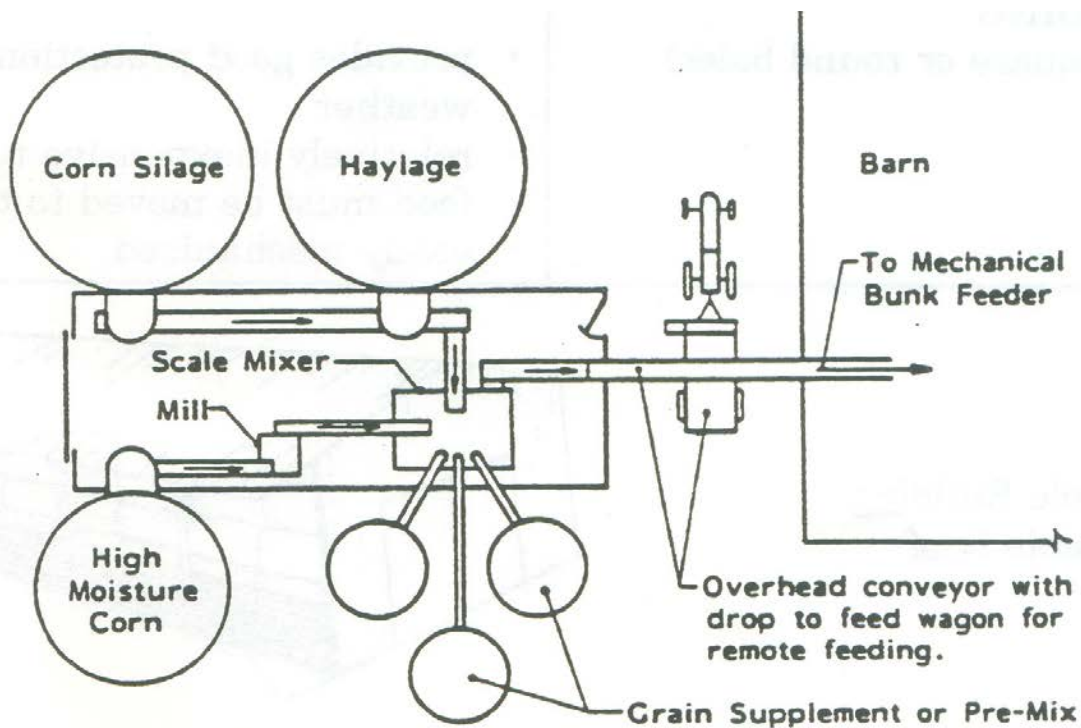
FEED STORAGE

Buildings used to house cows and heifers are not the only structures needed on the farm. Feed storage silos, bins and buildings play an important role in maintaining high quality feeds that are readily available on the farm throughout the year.

The type of feed storage on your farm will depend on the facilities you have and the feed you need to store. The chart on the following page gives you several options.

Structure and Feeds Stored in it	Characteristics
<p>Conventional Tower Silo</p> <ul style="list-style-type: none"> • Corn silage • Haylage • Ground high moisture grains • Corn cob meal 	<ul style="list-style-type: none"> • Top unloading so that the feed put in last gets used first. • Need to remove 5-10cm daily in winter and 7.5-10cm in warm weather to avoid spoilage. • Silo height determined by amount fed annually (or what the silo holds). • Fill with blower from self unloading truck or wagon. • Well suited to mechanical unloading. • Need to be well maintained.
<p>Oxygen Limiting Silo/Sealed Silo</p> <ul style="list-style-type: none"> • High moisture grains • Corn silage • Haylage 	<ul style="list-style-type: none"> • Bottom unloading so that the oldest feed gets used first. • Expensive but convenient.
<p>Horizontal Silo/Bunker Silo/Trench Silo</p> <ul style="list-style-type: none"> • Corn silage • Haylage 	<ul style="list-style-type: none"> • Adaptable to self feeding. • Difficult to mechanize. • Pack and cover to reduce losses. • Packing usually occurs with a tractor. • Polyethylene plastic with old tires on top is a common cover. Reduces losses but is expensive. • Labour intensive for packing, snow removal, covering. • Unload with tractor, unloader or by self feeding.
<p>Loft of Two Storey Barn</p> <ul style="list-style-type: none"> • Dry hay (square or chopped) • Dry grains • Mixed rations and supplements 	<ul style="list-style-type: none"> • Hard to change or improve facilities. • Bales put pressure on outside walls. • Storage is convenient (animals located below it). • Putting feed inside is labour intensive. • Expensive in new construction. • Can help insulate lower barn.
<p>Pole Building or Tarp/Fabric Buildings</p> <ul style="list-style-type: none"> • Dry hay (square or round bales) 	<ul style="list-style-type: none"> • Good weather protection. • Relatively inexpensive to build. • Feed must be moved to the barn. • Easily mechanized.
<p>Grain Bins</p> <ul style="list-style-type: none"> • Cereal grains • Dry corn • Supplements  <p>Wooden Granary Flat Bottom Bin Hopper Bottom Bin</p>	<ul style="list-style-type: none"> • Using augers to connect bins to each other and to feeding system makes grain transfer fairly easy. • Two types of bins: gravity flow unloading with hopper bottom and auger unloading with flat bottom bins. • Grain dryers are often used to speed drying of grain before storage.
<p>Outside Storage</p> <ul style="list-style-type: none"> • Baled dry hay • Extra crop if other storage is full 	<ul style="list-style-type: none"> • Short term solution. • Covering with plastic is expensive but reduces losses. • Feed is subject to weather conditions.

Several of the storage methods outlined on the last page may be used on a single farm. The system below shows one example of how feed storage can be integrated into the feeding system on the dairy farm:



Bringing Supper Home

Feed must be moved from the storage areas to the barns where animals need to be fed.

Tie Stall Barns – Feeds are brought to a feed room for mixing to create a total mixed ration (TMR) or to be fed separately. The feed is delivered to the cows by:

- Push carts that are unloaded by handcare, making them more economical.
- Power carts that are more expensive, but require less manual labour. They can also deliver feed to adjacent barns. They can feed TMR in different locations if they are equipped with weighing devices.
- Computerized grain feeders that are expensive, but convenient. They allow animals to be fed individually and can be programmed to deliver small amounts of feed to animals several times per day.

Free Stall Barns or Pack Barns – Feeding is usually done in a bunk filled by a mechanical conveyer or a mobile mixer that has a scale to weigh feeds. These systems are easily adapted to mixing complete, balanced rations to feed cattle in groups according to production. Computer feeding can be used to more accurately feed concentrates to individual cows within production groups in the free stall barn.

FARM SAFETY IN FEED HANDLING

It is important to protect yourself and farm employees from injury when dealing with all aspects of farming. Feed handling involves many potential dangers:

Flowing Grain – It only takes a couple of seconds to become trapped in flowing grain in a feed bin. In less than 10 seconds, you could become completely buried. To prevent being buried in flowing grain, never enter a bin while unloading is happening, never walk across stored grain, and always have another person with you if you need to examine a bin.

Silo Gas – Nitrogen dioxide (NO₂) is produced during the rapid fermentation of silage. This gas is heavier than air and settles to the ground. It can be colourless or a yellow-brown or reddish colour. It can be odourless or smell like bleach. It can kill someone within seconds, so it is important to follow several safety rules:

1. Post warning signs near the silo.
2. Do not enter the silo for three weeks after filling.
3. Ask your local fire department if they have pressure demand remote breathing available in case of an emergency.
4. Do not enter the silo to level it by hand.
5. Ventilation is important. Sealing the feed room while filling the silo and during fermentation will keep the deadly gas from entering the milking barn.
6. Make sure everyone on the farm knows what the gas is, how it is produced and that it is dangerous.

Silo Equipment Dangers – Make sure the silo ladder can be reached from the ground. If you need to climb it, attach yourself to a harness and make sure another person is around. Electrical controls should have lock switches to prevent someone from turning it on while it is being repaired.

Equipment Safety – All equipment with moving parts should be regarded dangerous. Ensure that augers, power take-off shafts and other motors are equipped with their protective shielding. Keep limbs away from moving parts. Do not wear loose clothing when working around machinery because your body could be sucked into a moving part if your clothing gets caught.

FARMING FOR A HEALTHY ENVIRONMENT

Maintaining a healthy environment is an important consideration for dairy farmers as they try to minimize the waste produced on their farms and design their operations in a manner that controls wastes as easily and efficiently as possible.

The main environmental concerns for dairy farmers are water, air, and soil quality.

Water Quality – Water is one of the most important resources on a farm. Its purposes include drinking, cleaning, and cropping. Since dairy cattle drink 50-130 litres of water daily and 87% of the milk they produce is made up of water, water is an absolute necessity.

Dairy farms must be designed in a manner that does not pollute drinking water. This is important not only for the farmer and his or her cows, but for the rural homes around the farm that need their water to be safe and taste good.

Water on the farm can become contaminated from three sources:

1. Manure.
2. Wash water from the milk house.
3. Pesticides used to kill bugs and weeds.

Air Quality – There is no doubt about it, farms can really smell bad! People and cows do not like the smell of manure. Bad odours can cause mood changes and upset stomachs.

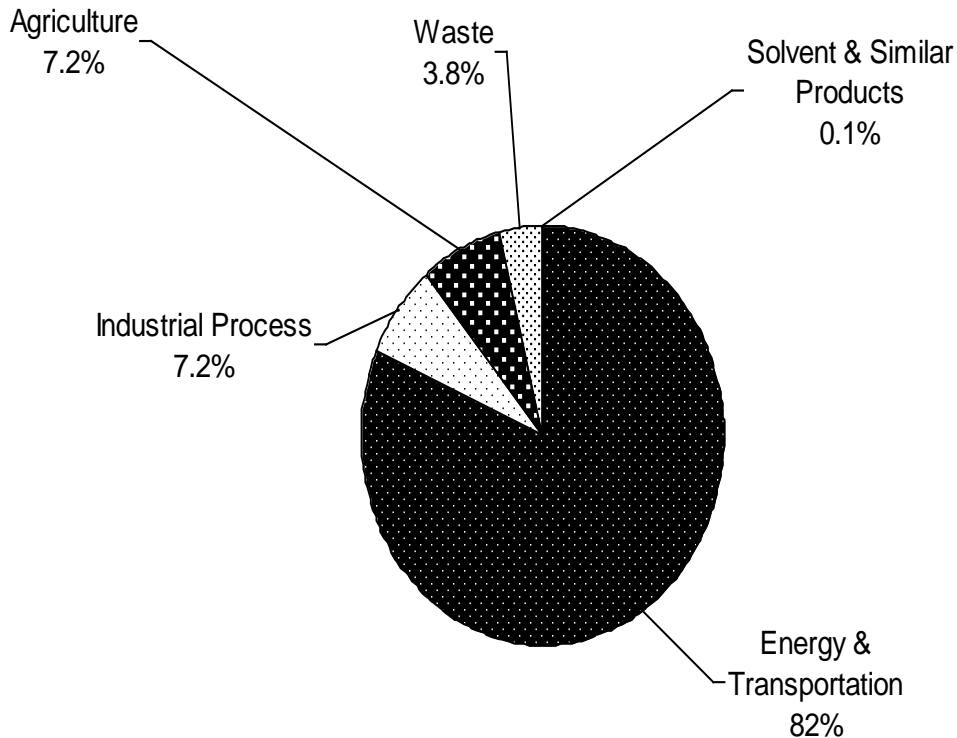
Air quality can also be affected by dust and other gases in the barn. Grain, hay and dried manure affect the air inside barns. Cows and farm workers breathe in those particles, potentially resulting in breathing problems and aggravated allergies. Even more dangerous than dust particles are the gases released from manure and silage fermentation, which can kill people and animals.

Soil Quality – Maintaining and improving soil quality means that crops grown will be better, with fewer inputs of fertilizers. Growing crops in a more productive and less expensive manner means that animal feed costs are lowered. Implementing a crop rotation plan on your farm, where different crops are rotated from field to field each year helps to keep the soil healthy.

Soil erosion is another problem that can be minimized by ensuring that land is not left bare. Leaving corn stubble on the land over the winter and planting cover crops helps to reduce erosion by wind and water. Creating windbreaks by planting trees is another way to reduce soil erosion; trees also provide the added benefits of shelter and clean the air. Trees clean the air by using up carbon dioxide and releasing oxygen in place of the carbon dioxide.

Greenhouse Gases and the Dairy Industry

There are many misconceptions about livestock farming and its contribution to greenhouse gas (GHG) emissions. In fact, agriculture as a whole is only responsible for only 7.2% of GHG emissions in Canada. That's 25 times less than the transportation sector!



Source: Ontario's Ministry of Environment

Reducing Greenhouse Gas Emissions

In 2002, Canada committed to reduce GHG emissions to 6% below 1990 levels by the year 2012 as part of the country's participation in the Kyoto Protocol. Between 1990 and 2003, GHG emissions from dairy cows had dropped 12% and since then have continued to lower by approximately 1% per year.

The Dairy Farmers of Canada, Soil Conservation Council of Canada, Canadian Cattlemen's Association and The Canadian Pork Council delivered programs promoting efforts of the Greenhouse Gas Mitigation Program for Canadian Agriculture (GHGMP). GHGMP was a program funded through the Government of Canada that ended in 2006. The dairy component entitled "Our Cows, Our Air" was very successful and resulted in many seminars and training sessions for Canadian Dairy Farmers.

There are several ways that dairy farmers can manage their animals to reduce the amount of methane and other emissions from each cow:

- Good breeding
- Improved milk production and feed efficiency
- High quality forages
- Well managed pastures
- Well formulated rations:
 - Feed additives
 - Balance the energy and protein in the ration
 - Lower forage to grain ratio in the ration
 - Process grain into smaller pieces to increase digestibility

These strategies are good for the farmer because they not only reduce GHGs, but these strategies also increase profitability! Cows that produce more milk usually produce less methane per litre of milk.

Cows are Natural Recyclers with Environmental Benefits

Despite some GHG emissions, there are many ways that cows act as recyclers with positive impacts on the environment. Some of these examples include:

- Cattle are often raised on pasture land that is unsuitable to grow crops for food production. This means that well managed pasture systems are able to effectively use land area that would otherwise be wasted.
- Crops grown to feed dairy cattle enrich the soil for crops grown for human consumption. For example, alfalfa and clover help the soil stay fertile for the growth of cereal crops such as wheat and oats. These crops also prevent soil erosion from wind and rain.
- Cattle eat leftovers of human food processing and agricultural byproducts. Some farmers feed their animals cereal wastes. More common are feeding brewers grains or distillers grains as protein sources. These grains are byproducts of beer and alcohol distillation processes.
- The manure that cows produce can be used to fertilize the soil, which, in turn, helps crops to grow better.
- When dairy cows are alive, they are used for milk production. When they are slaughtered, they are used for food production. They are also used for leather, bristles, medicine, gelatins and a variety of other products. That means that not very much of an animal is wasted.

Dairy Farms Can Reduce GHG Emissions by Managing Their Landbase

There are several things that dairy farmers (and other types of farmers) can do to manage their land in a way that is cleaner for the environment:

- Reduce tillage intensity.
- Timing of nutrient application to the needs of crops.
- Reduce soil compaction.
- Include more forage in crop rotations.
- Increase production on the land used for grazing.
- Replace permanent grass, wooded areas and shelters.

Creating Environmental Farm Plans (EFP)

An EFP is a tool farmers use to identify the positive and negative effects of farming practices on the environment. Once a farmer finds problems, he or she can find solutions to fix them.

When examining your own farm, examine air and water quality, use of chemicals, soil erosion, manure, wash water handling, fly populations and odour problems. Supportive grant funding may be available to assist with projects that benefit the environment.

Manure Matters

Manure is a valuable resource because it can be spread on the land as fertilizer. But it can also pollute the air and water, so it must be handled carefully. All farms should have some plan to manage manure. Storage facilities should be planned according to the amount of manure your cattle produce. The farm should have storage facilities for up to 240 days of the year. When there is less manure sitting around, there are fewer odours and gases.

Check This Out...

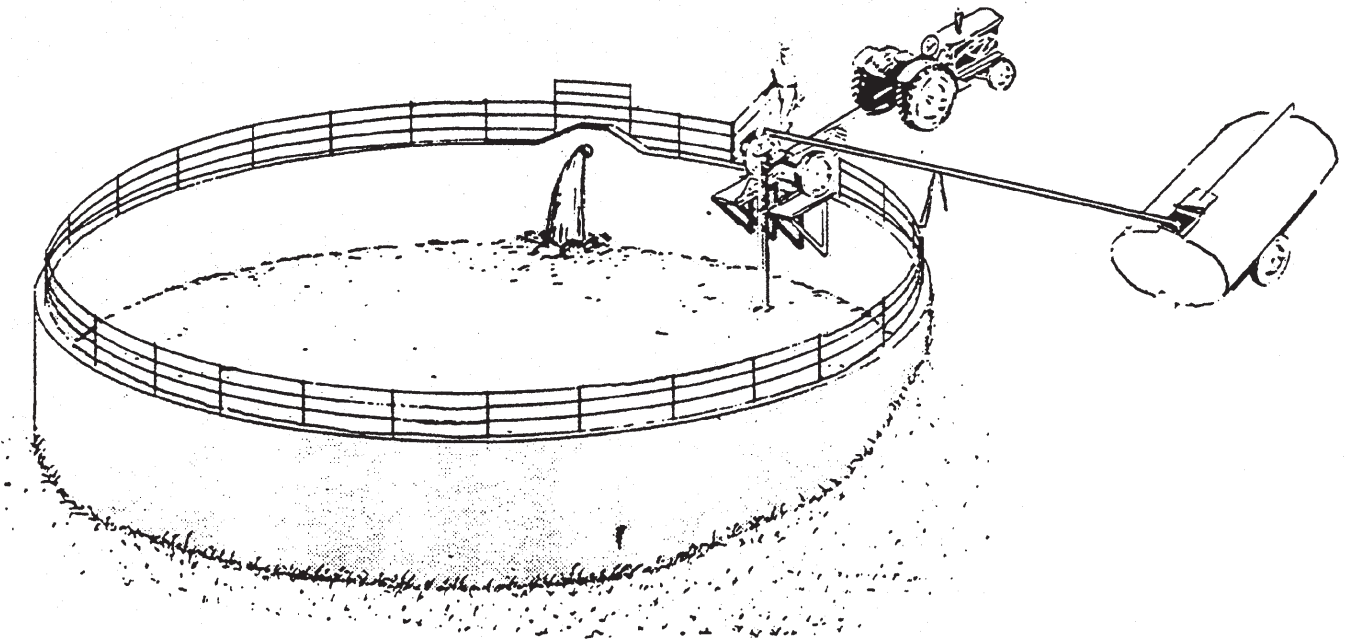
Manure contains 75 different odour causing chemicals. Since a 625kg cow will produce 60kg of manure and urine each day, that's a lot of smells!

Nutrient Management Plans (NMPs)

NMPs can be developed to protect water, soil and air quality, maximize crop production and reduce odours.

For farms to have effective nutrient management strategies they must have:

1. At least 240 days of manure storage on the farm.
2. Minimum Distance Separation – A specified distance between new barns and existing homes or businesses, which is determined by the number of animals the barn could hold, the type of manure produced, the size of the expansion and other factors.
3. A formal Nutrient Management Plan, which includes:
 - a. Soil test results
 - b. Nutrient storage areas (i.e. for fertilizers and manure)
 - c. When and how to apply nutrients to crops
 - d. Manure test results
 - e. Contingency plans in case a problem arises
 - f. Manure spreaders that calibrate for accurate nutrient application
 - g. "Good Neighbour" policy



Circular open reinforced concrete manure storage.

Manure Storage

Manure is approximately 85% wet matter and 15% solids. This means that manure can be handled as a solid, semi-solid or liquid. When more bedding is used for the animals, the manure becomes more solid.

How much manure storage do you need? As a rule of thumb, a 625 kg cow produces 0.07 m³ of manure each day (0.075 m³ if a lot of bedding is used). This formula will help figure out how big your manure storage area must be:

Liquid Manure Storage – This can be handled on the farm in several ways:

- Rectangular storage below a slatted floor barn.
- Circular concrete storage in the ground
- Silo-type concrete or steel storage above the ground.
- Earthen storage in clay soil.

Concrete structures may be covered or uncovered.

Semi-solid Manure Storage – A concrete slab is suitable for storage and can either be surrounded by a concrete slab or an earthen embankment. Like liquid storage methods, they can be covered or uncovered. Farms in areas where there is a lot of rainfall should cover their semi-solid storage structures to make the manure easier to remove later.

Solid Manure Storage – A concrete slab surrounded by a curb to hold in the liquid is sufficient to store solid manure. The curb prevents seepage of liquid into the soil and groundwater. Solid manure must be controlled to reduce flies and smells.

$$V(s) = N \times T \times V(m) + V(w)^*$$

$V(s)$ = total storage volume N = number of cows

T = storage time in days (should be at least 240 days)

$V(m)$ = manure production per day/per cow, including bedding

$V(w)$ = volume of water added (precipitation, milk house wash water).

Each year every m^2 of opening collects $0.55 m^2$ of rainwater.

**Source: "Tie Stall Dairy Housing", Agriculture Canada*

Remember: volume = length x height x width. This will help you with the calculations on your farm.

Spreading Manure – Farms do not have enough space to store manure forever, so it must be removed eventually. There are a few things to remember when spreading manure on your farm:

- Know the best time and amount to spread on your land.
- Apply it evenly.
- Re-calculate the amount of commercial fertilizers that will be needed to grow your crops.
- Apply manure when crops are growing and need the most nutrients.
- Do not spread manure if it is going to rain because this causes runoff, which can pollute water and prevent crops from getting the nutrients they need.

Milk House Wash Water

Manure and wash water are the main sources of waste on the dairy farm. Milk house waste contains detergents and acids that are necessary to clean milking equipment. Farms produce about 15 kg of wash water per cow per day. For example, a 100 cow herd uses 1500 kg of wash water each day or 547,500 kg each year. If it is not disposed of properly, it can pollute streams and groundwater. In streams, it causes algae to grow, which uses up some of the oxygen that fish need to survive.

There are different ways to handle milk house wash water:

- Add it to the liquid manure storage system.
- Store it separately.
- Treat it with a septic system and treatment trench.

THE FARMSTEAD: PUTTING THE PIECES TOGETHER

Most farmsteads include both the family home and the workplace. They include the house and barns and surrounding area. Since a farm family spends most of their time near the farmstead, the farmstead should be designed in a safe, healthy, well designed and convenient manner.

There are usually different zones on the farmstead. They could be viewed as public, private, and service:

PUBLIC	PRIVATE	SERVICE
<p>What people first see (needs to give a good impression):</p> <ul style="list-style-type: none"> • Area along laneway • Road entrance • Trees, lawns, shrubs, • Area visible from road 	<p>Informal and visible from the house:</p> <ul style="list-style-type: none"> • Garden • Children's play area • Deck, patio, pool • Recreation areas 	<p>The farm business areas:</p> <ul style="list-style-type: none"> • Driveway, garage • Workyard • Farm buildings and farm work areas

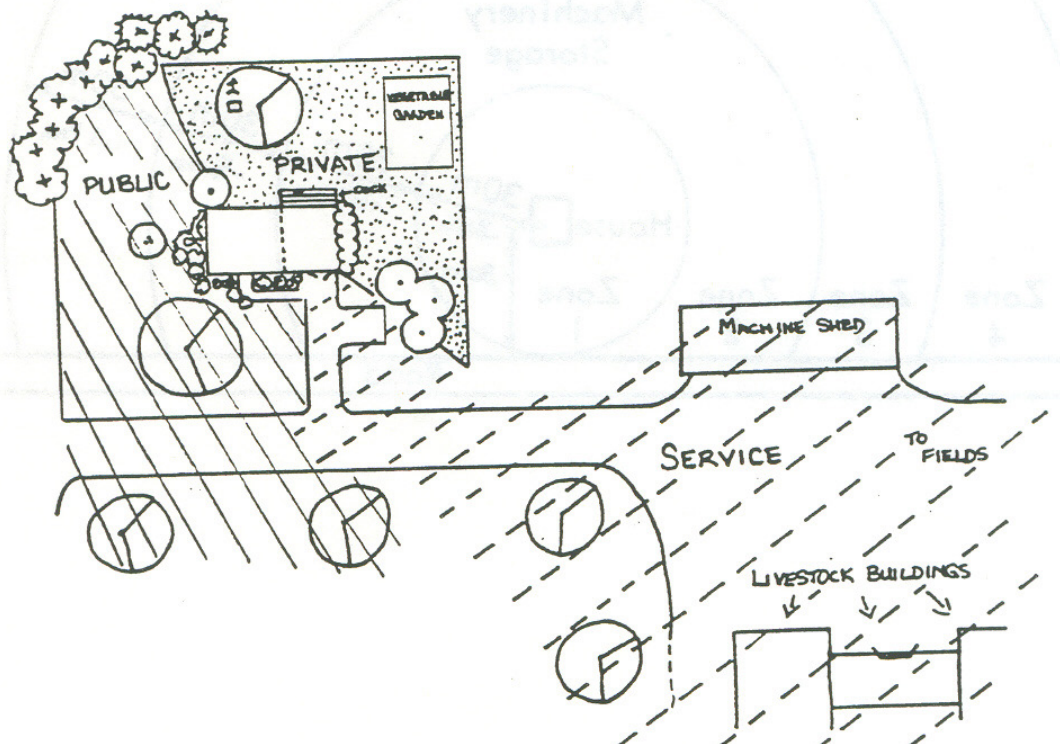
Another way to look at the farmstead is in zones of activity in terms of what should be located close and what should be further away from the living area of the farmstead.

Zone 1 – Where you live and play.

Zone 2 – Parking and farm workshop areas (no odours here).

Zone 3 – Smaller livestock, crop storage and feed storage facilities.

Zone 4 – Major livestock facilities, forage and silage storage, pastures, manure storage and disposal, milking equipment centre.



It is important to ensure that these areas are set up well in relation to one another (i.e. no manure smells in the house) but also that they obey laws and meet the requirements of nutrient management, your local municipality, and your dairy regulatory agency.

PLANNING A NEW FACILITY?

If you are thinking about building a new farm structure, there are many things to consider and research so that you make sure you build exactly what you want:

1. **Establish goals** – What will the building be used for? What does it need to hold?
2. **Collect information** from tours, magazines, contractors, etc.
3. **Evaluate alternatives** – Is there something new or unheard of that would work?
4. **Plan it out** on paper.
5. **Layout to scale** – This will help you see how manufactures will fit on your farm, and if these features will be the right size.

How will the new building fit into the farm?

There are certain locations where it would be suitable to build and other places that would not be very good at all! There are a few things to consider when figuring out where to build:

1. **Topography** – Is the ground level or sloped?
2. **Soil** – Make sure it is deep enough to dig, but remember that you probably do not want to use up your best farmland for a building.
3. **Climate** – Will the building be naturally ventilated? What direction does the wind blow? Will there be enough sunlight to warm it in the winter?
4. **Existing buildings** – Will the new facility blend with the rest of the buildings and be convenient for access to feeding or cleaning? Does it prevent future expansion? Remember that existing buildings can change where sunlight will fall and can also change the wind pattern.

The Building

There are many things that new animal housing might need, such as:

- Feed storage and a way to feed animals
- Manure removal and storage area
- Drinking water
- Utilities (i.e. hydro)
- Access to other buildings
- Ventilation
- Environment – cold or warm

Need to expand? Don't want to rebuild? Remodel!

Remodeling is often an inexpensive way to accomplish your goals. Just like redoing a room in your house, it can be satisfying to turn a useless space into something functional. As with rebuilding, there are several things to consider when renovating a farm structure:

- **Location, location, location** - If you do not like where the old building is, you are probably better off to tear it down and start over than to remodel it. Make sure the building is far enough away from the farmhouse, other neighbours, other buildings, and drainage, and has easy access for feeding and manure removal. Take note of the prevailing winds. You do not want snow and rain blowing into the barn but you also do not want the smell of manure blowing towards your house.
- **Current Use** - Will you ever need the building for its current purpose again?
- **Building Structure** - Do not remodel if the building is cracking or falling down and needs a lot of major repairs to the roof or walls.
- **Ventilation** - Natural ventilation is best! Buildings should be at least 15m from trees and silos, and 23m from other buildings.
- **Size** - Make sure the animals have enough space and are not crowded.
- **Cost** - Make sure that it really is cheaper to remodel than it is to rebuild. Remember that it usually costs 10-20% more to remodel than your initial estimate will tell you!

VO-COW-BULARY

Bedding	Material such as straw, wood chips or sand used as cushion for animal comfort.
Bulk Tank	A refrigerated stainless steel storage unit where milk is cooled quickly to 1°C to 4°C (35° F to 39° F) and stored.
Free Stall Barn	The cows are housed in large group pens or individual stalls without being tied. The cows are loose in the barn with access water and feed in specific places. They get milked by walking to a milking parlour or a milking robot.
HACCP	This acronym stands for Hazard Analysis Critical Control Point (HACCP). This is a quality assurance program that identifies risk factors (critical points) in an effort to reduce them to an absolute minimum. Dairy Farmers of Canada has developed an on-farm food safety program, called Canadian Quality Milk, which is recognized by the Canadian Food Inspection Agency.
Milk House	A section of the barn that houses the milking and sanitizing equipment, as well as the bulk tank, in which the milk is stored and cooled.
Milking Machine	A machine used to obtain milk.
Milking Parlour	A cow walks onto a raised platform with gates, which keep the animal from moving while she is being milked. The milk goes directly from the milking machine through a pipeline to the bulk tank in the milk house. When milking is over, the cow leaves.
Pack Barn Housing	A type of loose housing with separate areas for eating, drinking, resting and milking. Animals rest on large bedding packs instead of in stalls.
Pipeline	Glass or stainless steel pipe that collects the milk from the milking machines and brings it to the bulk tank.
Robotic Milking System	Also called a Voluntary Milking System or Automatic Milking System. This setup is similar to a parlour system, except that the entire milking system is automated. Cows can enter the robot at anytime during the day to be milked. This technology is still new to North America.
Silage	Made of grasses (e.g. hay), legumes (e.g. alfalfa) or corn, which are chopped and stored while still moist in a silo.
Silo	Silos are extremely useful to store a wide variety of livestock feeds, including silage. A silo can be vertical (like a tower) or horizontal (called a bunker).
Slatted floor	A floor with open spaces to allow evacuation of manure.
Stall Base	The material located under the bedding in an animal's stall or pack.
Tie Stall Milking System	In this type of barn, the cows are tied in stalls next to each other. They have constant access to water and are fed in a manger in front of them. The cows are milked in their stall.

Tingle Voltage	Also called stray voltage, this electrical current adversely affects animals in their housing environment.
Time Temperature Recorder	An electronic device that records milking and washing times and temperatures in the pipeline and bulk tank. An alarm sounds when temperatures or timing of the washing cycles is inadequate.
Ventilation	Ventilation is extremely important in dairy barns as cows need to have access to fresh air year-round. There are several types of ventilation systems that are adaptable to the change in seasons. Natural ventilation is the result of natural air flow and mechanical ventilation is the result of air movement by fans.

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 - Ontario Farm Animal Council
 - Ministry of the Environment

RELATED ACTIVITIES (SEE LEADER'S GUIDE)

The Ideal Calf House	Housing	All ages
Building a Calf House	Housing	All ages
Calf House Inspection	Housing	All ages
Farmstead Planning - Constructing a Calf House	Housing	Senior members
Keeping them Separate - Heifer Housing	Housing	All ages
Qualities of Heifer Housing	Housing	All ages
Heifer Housing Match Up	Housing	All ages
Having a Heifer Building Plan	Housing	Senior members
Exploring Heifer Housing	Housing	All ages
Stall Sketch	Housing	All ages
Mechanics of a Milking Machine	Housing	All ages
Proper Milking Procedures	Housing	All ages
Looking at Feed Storage	Housing	All ages
Safety Lessons	Housing	All ages
Looking at Farmsteads	Housing	All ages
You Be the Judge - Farmstead Planning Selection	Housing	All ages
Evaluating Farmsteads	Housing	All ages
My Space - Your Space	Housing	All ages
Ventilation Demonstrations	Housing	All ages
Ventilation Case Studies	Housing	Senior members
Manure as a Resource Demonstration	Housing	All ages
The Manure Cycle	Housing	All ages
Manure Handling	Housing	All ages
Liquid Manure System Safety	Housing	All ages
Elements of an Efficient Dairy Facility	Housing	All ages
Testing the Water	Housing	Junior members
Getting Along with the Neighbors	Housing	All ages
Creating an Environmental Farm Plan	Housing	Senior members
Keep Your Water Clean, Clear and Cool!	Housing	Junior members

REPRODUCTION AND BREEDING

Believe it or not, the reproductive cycle of a cow is central to the entire business of a dairy operation!

Cows must have a calf before they are able to produce milk. Heifers must have a calf before they can produce any milk during their lifetime, and older cows must keep having calves at regular intervals to keep producing milk. The calves themselves are also important as they will eventually be needed to replace older cows in the milking herd and to bring better genetics into the herd for improvement.

There are 5 things needed for a successful breeding program:

1. Goals.
2. A good heat detection system.
3. A good herd health program.
4. A balanced nutrition program.
5. Knowledge of breeds, traits and genetics.

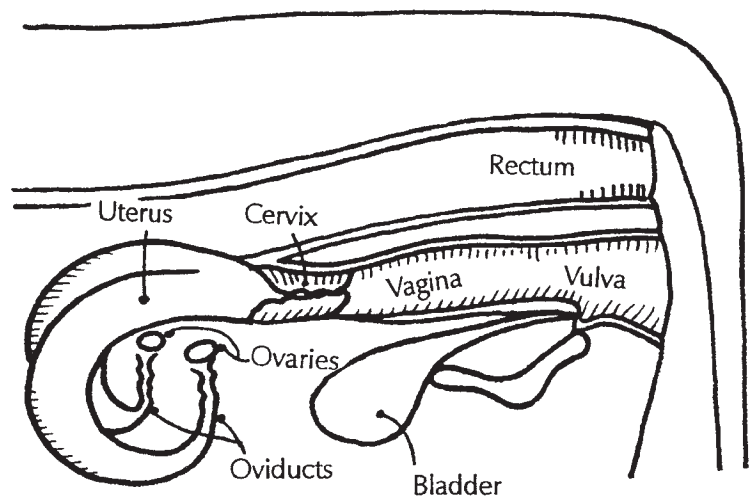
In order to understand the whole process, it is important to understand the reproductive body parts of a cow and how they work!

THE CALF FACTORY: THE FEMALE REPRODUCTIVE SYSTEM

Cows are mammals; therefore, they produce eggs internally. These eggs may be fertilized and result in a baby calf that grows inside of the cow's body. Like other mammals, cows produce milk to feed their babies once they are born. Cows have the same basic reproductive system as other animals, like pigs, horses, and even humans.

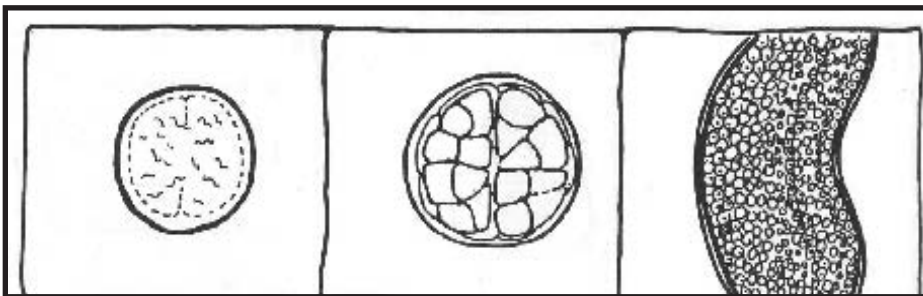
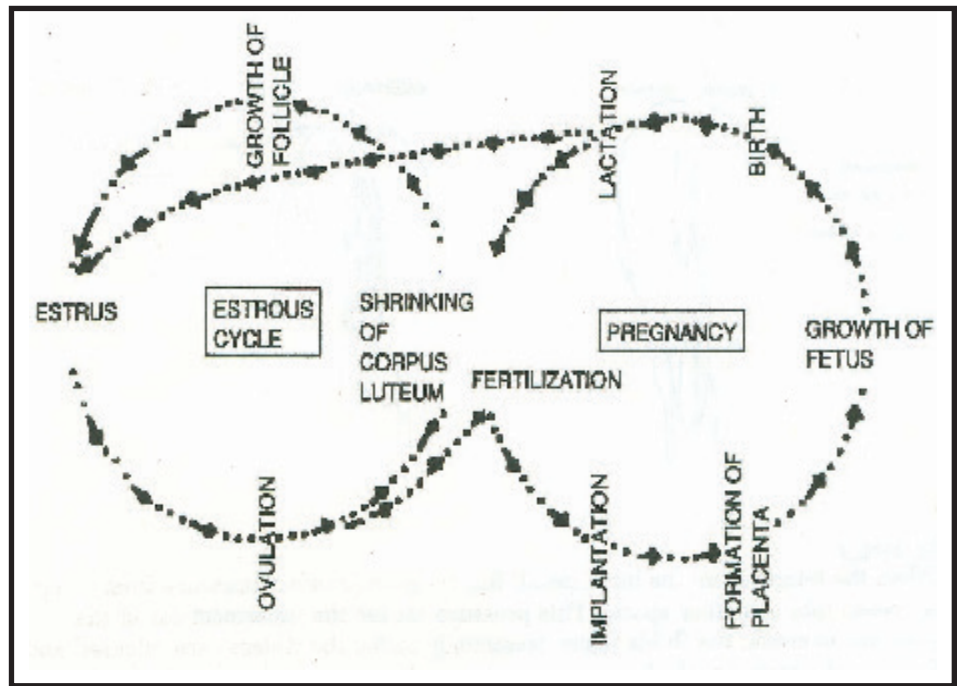
The main parts of the cow or heifer's reproductive tract are her ovaries, oviduct, uterus, cervix, vagina and vulva.

First are the ovaries. There are two of them, and they are round or bean shaped. Ova (or eggs) are produced inside the cow's ovaries. Inside the ova are chromosomes. These contain half of the genetic material for an animal. The other half of the genetic material comes from a male's sperm. The chromosomes from both the ova and the sperm combine to form the genetic blueprint for the growth and development of a fetus.

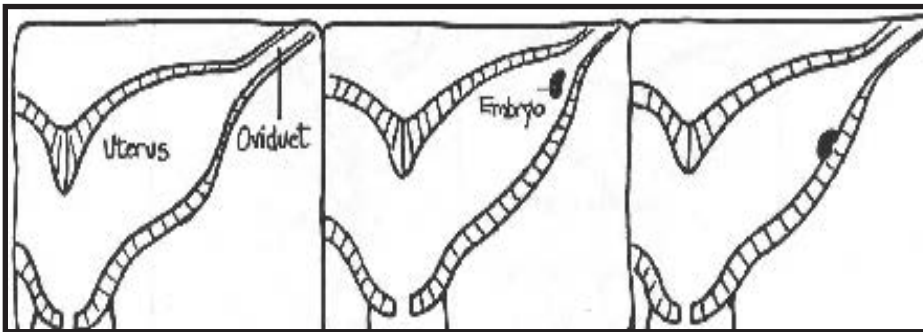


During a cow's reproductive cycle, a fluid-filled follicle containing one egg begins to grow on the ovary. During ovulation, this follicle bursts and the egg is released. The follicle that has released the egg turns into a hard-raised structure, called the corpus luteum (C.L.). It may also be called the yellow-body because it is yellowy-white in colour. The released egg then travels into the oviduct, a thin tube.

Once the egg is in the oviduct, one of two cycles can occur, depending on whether or not the cow is bred.



Newly fertilized egg divides to form an embryo.



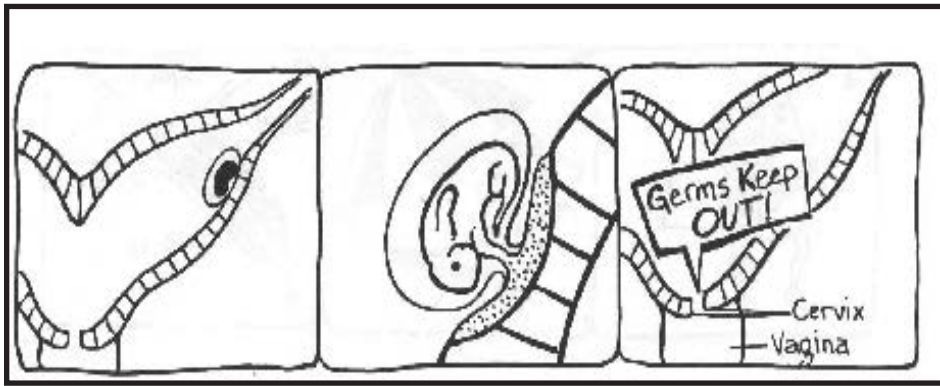
Movement of embryo into the uterus.

Cycle 1: No Fertilization

If the cow is not bred and there is no sperm for the ovum to meet with, the C.L. shrinks. When this shrinking is complete, new follicles will begin to develop and the cycle starts again.

Cycle 2: Pregnancy

If breeding happened and the ovum meets up with a sperm cell from the male, fertilization occurs. The two cells, each containing one half of the genetic material, combine to form an entire cell. This single cell is now ready to grow and develop into a calf. The cell continues to divide to create many more cells and is now called an embryo.



Implantation of embryo and growth of fetus

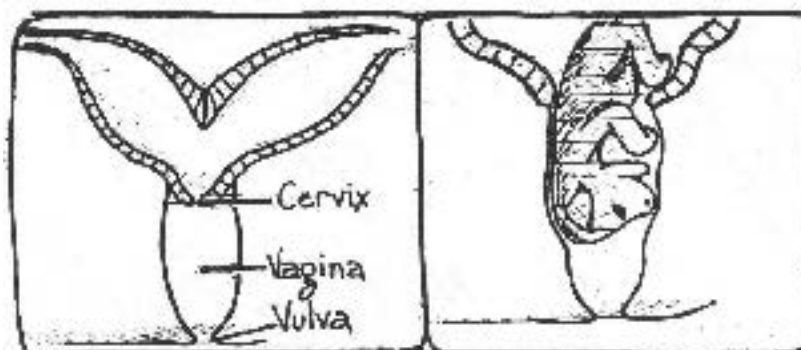
The **oviduct** opens into the horn of the uterus. The uterus is a big tube that is flexible, muscular and shaped like a “Y”. Each uterine horn itself opens into the body of the uterus. By the time the embryo reaches the uterus, it is a cluster of cells. The embryo attaches to the inner lining of the uterus 7-10 days after its release from the ovaries. This attachment is called implantation. Once the embryo has implanted itself into the uterus, it is called a fetus. At this point, the C.L. sends hormones to signal to the cow’s body that she is pregnant.

The lining of the uterus and the fetus form a fluid-filled membrane for the fetus to grow in. This is called the **placenta**. The placenta allows nourishment to pass from the mother to the fetus and for waste material to pass from the fetus to the mother via the umbilical cord. It also absorbs shock and helps to keep some diseases away from the fetus. The fetus grows and causes the uterus to expand.

The outer entrance to the uterus is the **cervix**. During estrus, it relaxes to allow sperm cells to enter the uterus en route to the oviduct. It also relaxes during birth to allow the fetus to exit. The rest of the time, the cervix is closed and helps to prevent infection from entering the uterus.

The **vagina** is the canal that leads from the cervix to the outside of the cow’s body. The vulva is at the outer end of the vagina. The vulva is the outer part of the reproductive system that you can see from outside her body.

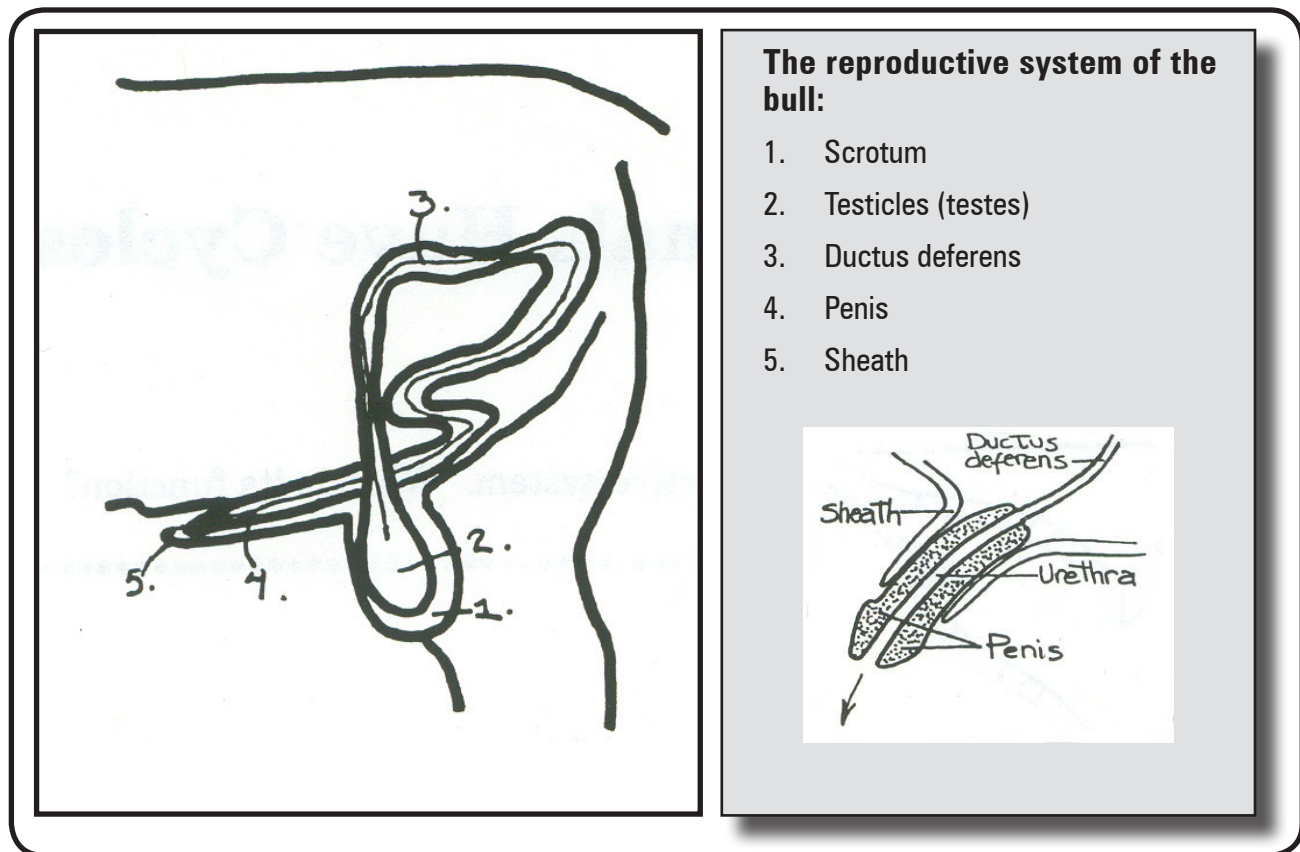
The cervix, vagina, and vulva are all very flexible. They need to be flexible so they can expand to several times their normal size to allow the fetus to be delivered during birth, as seen in the diagram below:



THE OTHER HALF: THE MALE REPRODUCTIVE ORGANS

The male reproductive system contains half of the genetic material for an animal. Each male has two **testicles**. They produce millions of microscopic cells called **sperm**. The sperm are the cells containing genetic information.

The testicles are located inside the **scrotum**, which can be seen between the bull's hind legs. The testicles hang outside the body to keep them at a slightly cooler temperature since sperm do not survive as well at higher temperatures. During breeding, sperm travels through a thin tube called the **ductus deferens** and enters a larger tube called the **urethra**. Other fluids are added to the sperm en route. The urethra travels through the centre of the **penis**. The penis is usually hidden by a fold of skin called the **sheath** and is only visible when the animal is urinating or breeding.



Male Reproductive Failure

There are a number of reasons why a bull may be unsuccessful in providing viable semen:

1. **Too young** - Young bulls only produce half as much sperm as older bulls, reducing the chance of fertilization.
2. **Stress** - Low sperm count and low sex drive can result from poor nutrition, breeding too often or obesity.
3. **Infection** - Infection can result in deformed sperm or low sperm counts. Since it takes sperm weeks or months to form, it could take awhile before the effects of a minor infection are even noticed. Rest and treatment are required for the male to breed again.

DIGGING DEEPER - CONTROL OF THE CYCLES

Whether it is the estrous cycle, the sperm production cycle, or the pregnancy cycle, the whole reproductive system of cattle is controlled by hormones.

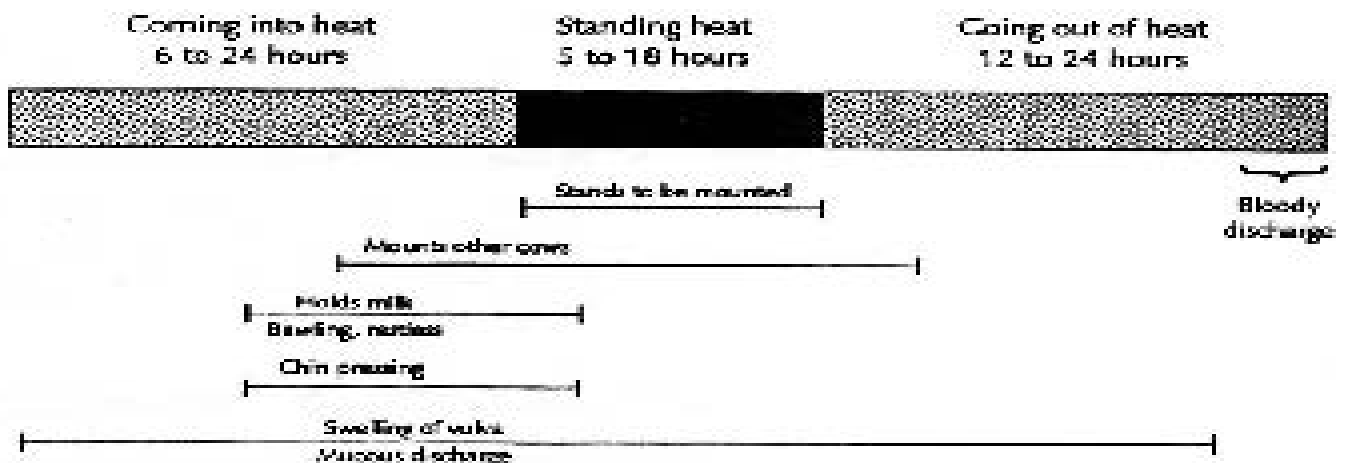
The chart below describes all of the hormones involved in the various repetition cycles and their function:

HORMONE	SOURCE	EFFECT	OTHER INFORMATION
FSH (Follicle Stimulating Hormone)	Pituitary gland in the brain	<ul style="list-style-type: none"> Stimulates follicle growth on the ovary of the female. Stimulates growth of sperm cells of the male. 	<ul style="list-style-type: none"> FSH levels are high late in estrous cycle. A FSH injection, administered by a veterinarian, can induce ovulation.
LH (Luteinizing Hormone)	Pituitary gland in the brain	<ul style="list-style-type: none"> Activates ovulation (egg release from follicle). Controls C.L. development. Stimulates secretion of progesterone in females and testosterone in males. 	<ul style="list-style-type: none"> Used to treat ovarian cysts.
Estrogen	Ovaries	<ul style="list-style-type: none"> Produced by developing follicles. Stimulates signs of estrus (heat). 	<ul style="list-style-type: none"> Estrogen levels in blood are high during estrus.
Progesterone	Ovaries	<ul style="list-style-type: none"> Produced by the C.L. Helps prepare for and maintain pregnancy. 	<ul style="list-style-type: none"> Low levels of progesterone in the blood during estrous but high during pregnancy.
Prostaglandins	Uterus	<ul style="list-style-type: none"> Causes the C.L. to shrink. Stimulates start of heat and birthing process. 	<ul style="list-style-type: none"> Often injected to trigger birth or bring an animal into heat.
Prolactin	Pituitary gland in the brain	<ul style="list-style-type: none"> Stimulates milk production and secretion by mammary gland. 	<ul style="list-style-type: none"> Levels in the blood are high during lactation.
Testosterone	Testes (testicles)	<ul style="list-style-type: none"> Responsible for development of secondary sex organs, sexual characteristics and behaviour. 	<ul style="list-style-type: none"> Fairly constant after puberty.

A CLOSER LOOK AT THE ESTRUS CYCLE – THE 21 DAY SHIFT!

When the ovary releases an egg from a follicle, the cow shows signs of “heat”. Heat signs indicate that a cow is ready to be bred.

The best sign of heat is when a cow remains standing to be mounted by another cow, a stage referred to as standing heat. A cow needs to be bred 12-24 hours after standing heat is observed.



Other signs of heat are:

- Bawling, restless behaviour.
- Butting.
- Swollen, reddened vulva.
- Mucous discharge.
- Withholding milk.
- Increased urination.
- Mounting other cows.
- Chin pressing on other cows.
- Sniffing, licking of the vulva, lip curling.
- Pays little attention to feed.

Heat detection is a very important part of herd management as this allows you to know when cows are ready to be bred. This way they can get in calf quickly and semen is not wasted on cows that are not really in heat.

Rule of Thumb: Farmers should spend at least twenty minutes three times each day watching their animals and recording any signs of heat that they see.

If cows are only watched once per day, less than 60% of heats will be caught.

While a set of human eyes is the best detector, farmers can get extra help with heat detection because it is hard to be around to see every heat:

- **Heat mount detectors** - A patch filled with dye is applied to a cow's rump. If it changes colour, it proves that the cow was mounted and is in standing heat.
- **Computer transmitters** - Pressure triggered transmitters send a computer signal to a receiver when the cow is mounted. The receiver forwards the information to a computer indicating the cow's name or herd identification, number of mounts and the mount time/length.
- **Heat detector animals** - Heifers treated with hormones can detect heats in cows. A chin ball marker attached to the treated animal causes her to mark any cows she mounts.
- **Pedometers** - These monitors record how much a cow walks and transmits the information to a computer. The computer calculates the cow's average physical activity. Cows are usually more active when they are in heat so the heat is detected when the cow has more movement than usual.

What if She Does Not Come into Heat?

Anestrus means 'no estrus' and is used to describe an animal that does not come into heat. There are different types of anestrus:

1. **Lactational anestrus** - Is when an animal does not cycle when it is nursing its young. This is rare in dairy cows because they are usually milked by a machine and are not bonded to their young.
2. **Pregnancy** - Cows/heifers do not cycle when they are pregnant.
3. **Anestrus due to infection or illness** - Unhealthy animals often do not come into heat. For example, a uterine infection can prevent ovulation and therefore, prevent estrus.
4. **Anestrus due to cystic ovaries** - This is very common in dairy cattle, especially early in their lactations. Cystic ovaries occur when the follicles grow but do not release the ova from inside them. While this usually leads to anestrus, it can also have the opposite effect – increased frequent estrus behaviour (also known as nymphomania).

While hormone therapy can provide treatment, the best way to deal with anestrus is to prevent it by:

- **Keeping animals healthy.**
- **Knowing your animals' cycles** - When should or shouldn't they be cycling. Individual animals may behave in slightly different ways when they are in estrus (heat).
- **Keeping records of reproductive events** – You can find anestrus problems sooner if you know how long it has been since an animal has calved, or last shown a heat.
- **Close observation** – Watching for heats is important. Many high producing animals will not even be truly anestrus. They will be having estrous cycles but not displaying the signs of a heat. This is called a 'silent estrus' or 'silent heat' and often occurs when animals are in closed housing a lot. Detection by a veterinarian will help identify the cycle and allow the cow to be rebred more quickly.

DIGGING DEEPER - MANAGING HEAT CYCLES

Reproductive Goals

A good breeding program should have several goals to ensure that the cows have the greatest opportunity for production over the course of their lifetimes. The table below shows a few main goals:

MEASURE OF PERFORMANCE	GOAL	TOO HIGH, NEEDS WORK
Interval from calving to first heat <ul style="list-style-type: none"> Number of days from the time a cow calves until she comes into heat again. 	40 days	60+ days
Days to first service <ul style="list-style-type: none"> Number of days from calving to the first breeding. 	70 days	90+ days
Days open <ul style="list-style-type: none"> Days when the cow is not pregnant, measured from the time of calving until a successful breeding. 	85 days	110+ days
Calving interval <ul style="list-style-type: none"> Time between one calving and the next calving. 	12.5 months	13+ months
Services per conception <ul style="list-style-type: none"> Average number of times each cow needs to be bred before she becomes pregnant (The closer to 1.0 the better). 	1.5 to 1.7 times	2.0+ times
First service conception rate <ul style="list-style-type: none"> The percentage of cows that become pregnant on the first breeding. 	60%	Less than 50%
Cows culled for reproductive reasons <ul style="list-style-type: none"> The percentage of cows that have to be culled because they cannot conceive. 	5%	10%+
Age at first breeding <ul style="list-style-type: none"> Aim to breed heifers so they will calve by 24 months of age. 	15 months	17+

To ensure that breeding goals are met, it is important to watch animals carefully for heats and to ensure that all animals in the herd are healthy. Individual farmers may have other factors that help them decide when to breed some, or all, of their animals. Other factors that can affect decisions about the timing of breeding are: schedules for showing cows and calves so that the animals born are ready to show at the right time; allowing smaller animals to grow a little longer before breeding; calving at the proper time to have more milk for incentive days, etc.

Breeding Heifers

While the goal is to breed heifers at 14 to 15 months of age so that they are calving out at 23 or 24 months, it is important that the animals are large enough to be bred at that time. The chart below shows minimum breeding sizes for different breeds of dairy cattle:

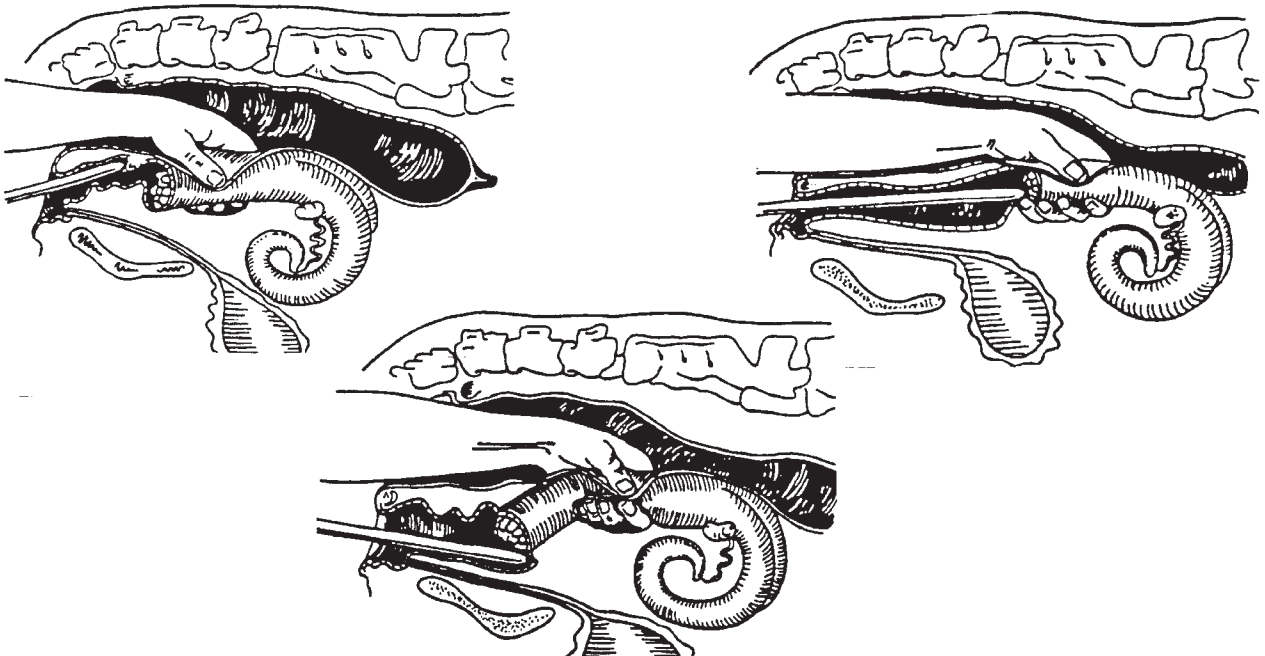
BREED	WEIGHT	HEIGHT
Holsteins and Brown Swiss	366kg	130cm
Ayrshires and Guernseys	310kg	122cm
Jerseys	268kg	115cm

MANAGING REPRODUCTIVE CYCLES – IT'S BREEDING TIME!

There are two methods of breeding cows and heifers once they are in heat:

1. Artificial insemination (AI)
2. The Natural Method (keeping a bull on the farm)

While the natural method is self-explanatory, AI requires more technology. AI is a technique in which male semen is collected and later implanted in females. At an AI collection facility, the male mounts a dummy female and ejaculates into an artificial vagina. The semen is then collected and mixed with an antibacterial agent (i.e. penicillin). It is then frozen along with an extender that will help preserve the semen for a long period of time. The frozen semen remains submersed in liquid nitrogen until it is used on farms, at which point it must be warmed slowly. Once cooled, the semen must be inserted into the cow within a few minutes to optimize chances of semen survival and thus, a successful breeding.



The chart below compares the two methods of breeding:

FACTOR	Advantages (☑) and Disadvantages (☒)	
	ARTIFICIAL INSEMINATION	NATURAL
COSTS*	<ul style="list-style-type: none"> ☒ Each vial of semen costs money. ☒ Fee for insemination costs. 	<ul style="list-style-type: none"> ☒ Buying the bull. ☒ Feeding the bull. ☒ Medical bills.
CHOICE	<ul style="list-style-type: none"> ☑ Can select bulls from local AI units, or anywhere in the world, to match the needs of your herd. 	<ul style="list-style-type: none"> ☒ Most farms just keep one bull.
CONCEPTION RATES	<ul style="list-style-type: none"> ☑ High with good heat detection system. 	<ul style="list-style-type: none"> ☑ High with good heat detection system. ☑ May be more likely to inseminate 'problem breeders'.
HEALTH	<ul style="list-style-type: none"> ☑ Bulls are all tested for disease ☑ Little chance of spreading disease. 	<ul style="list-style-type: none"> ☒ Can spread diseases from bull to cow. ☒ Bull can injure a cow or himself during breeding.
RISKS	<ul style="list-style-type: none"> ☑ Few. 	<ul style="list-style-type: none"> ☒ Bulls are unpredictable and extremely dangerous.
GENETICS	<ul style="list-style-type: none"> ☑ Can choose from the best, most modern genetic pool. ☑ Good genes are proven because the bull has many daughters in other herds. ☑ Sexed semen can be purchased to increase likelihood of female offspring. 	<ul style="list-style-type: none"> ☒ Some bulls have genetic records but there is no choice of genetic selection when you only have one bull on the farm. ☒ No proof that his genes are good. ☑ Alberta Government birth certificates provide age verification.

Artificial insemination clearly provides more opportunity to improve genetics in the herd. Many herds use AI primarily and then use a 'clean up' bull to impregnate the cows that do not successfully get bred by artificial insemination.

*While cost is viewed as being a disadvantage at the outset, the value associated with obtaining world-class proven genetics can ultimately end up being quite cost effective.

Programmed AI Breeding using Prostaglandin

Timing is very important in AI breeding to get a high conception rate on the first service. Farmers can use prostaglandin to program breeding and bring cows into heat at a predictable time.

Prostaglandin is a natural hormone in the cow's estrus cycle. The uterus produces prostaglandin if the cow does not become pregnant during her cycle, so that she will come into heat again.

Manufactured prostaglandin mimics the natural hormone. When injected, a cow will come into heat right away. This alters her estrus cycle so that you can use AI to breed her at a suitable time. If a cow does not show a heat the first time, sometimes prostaglandin must be administered again 14 days later. It can be used on problem cows or as a regular part of your breeding program.

Knowing when a cow should be coming into heat helps with heat detection and increases the likelihood of a successful breeding. It can help to achieve reproductive goals like low calving intervals and reduce the number of days open.

OTHER BREEDING OPTIONS

While artificial insemination and the barnyard bull are the most common methods of breeding cows, modern technology has led to the development of other methods of getting cows pregnant.

Multiple Ovulation and Embryo Transfer

This reproductive method has been in use for many years. It is an expensive process, so farmers usually only use this method to harvest embryos from their best animals. Poorer animals or virgin heifers are often used as recipient animals.

The process requires several steps:

- The donor dam is injected with Follicle Stimulating Hormone (FSH) for a few days. This causes her to release more ova than usual. This process is called superovulation.
- The cow is bred (typically using artificial insemination) during her heat. Since superovulation results in more ova, more sperm can fertilize them, resulting in more than one embryo.
- The embryos are flushed out of the uterine horns using a catheter and are isolated using the help of a microscope.
- The eggs can be implanted fresh into animals that were at the same point in their cycle as the donor dam was, or they can be frozen in liquid nitrogen for later use, just like semen is. If the embryos are intended to be sold to another country, they must be "washed for export" before freezing. This means that the embryos are rinsed in a trypsin solution that helps prevent the spread of disease.
- The donor dam can be rebred on her next heat.

The steps of embryo transfer in dairy cattle are indicated in the diagrams below and on the following page:

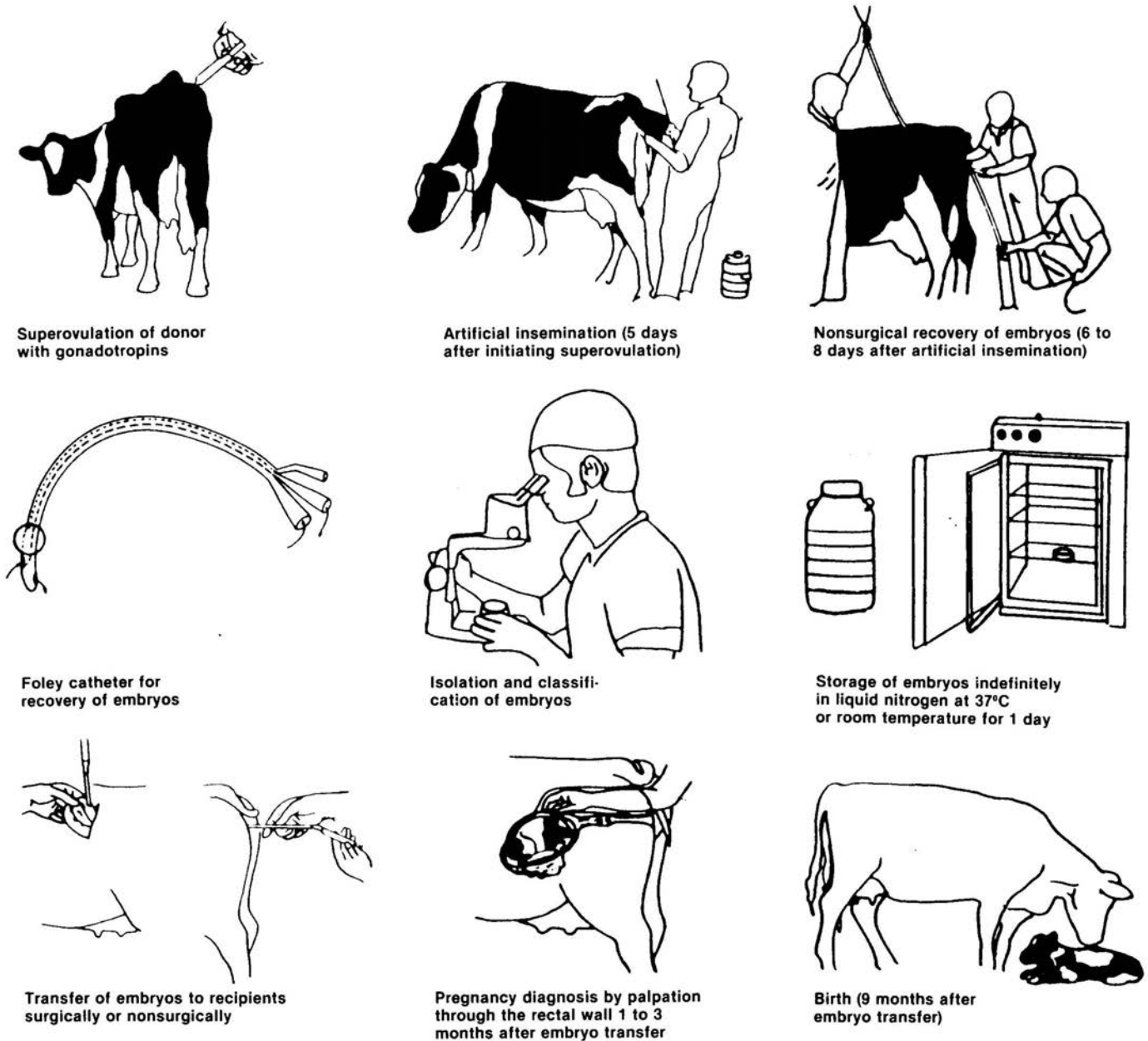


Fig. 1. Synopsis of bovine embryo transfer procedures. From Seidel, G. E., Jr., Superovulation and Embryo Transfer in Cattle, Science, Vol. 211, 23 Jan. 1981, p. 353.

In Vitro Fertilization (IVF)

In vitro means “out of the body” as opposed to other types of breeding that occur inside the cow’s body, or “in vivo”. In this type of breeding, an unfertilized egg is removed from a cow’s ovary by a technician. Then the egg is fertilized by the semen that it is combined with it in a laboratory dish. The embryo is then implanted in a recipient just like embryos that are transferred after multiple ovulations and embryo transfer.

Eggs can be taken from live cows or recovered from the ovaries of a dead cow.

When eggs are taken from dead/culled

animals, the process is called genetic salvage. Using very advanced technology, eggs can even be harvested from two or three month old calves. This decreases the time required from one generation to the next, and thus increases the rate of genetic improvement. It also makes it possible to save the eggs of a valuable animal that dies.

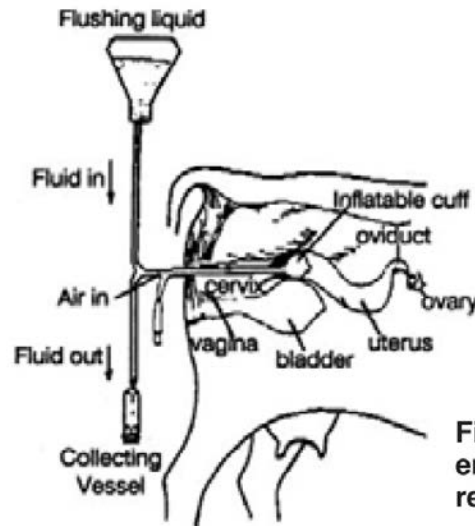


Figure 1. Diagram of the embryo flushing and recovery procedure.

Cloning

In recent years, reproductive technology companies have begun cloning famous cattle. This process, using cells from the donour animal, is very expensive and due to costs, health, and moral concerns, it has not become a mainstream activity. Significant testing has been done, mostly in the United States, to determine if the milk produced from cloned animals is safe for human consumption. Studies thus far indicate that it is safe and poses no risk to the animals or humans ingesting food from cloned animals.

For an illustration of how cloning is done, visit the website of the University of Tennessee’s cloning project: <http://animalscience.ag.utk.edu/utcloneproject/pdf/AJRIVCloningReviewFigures.pdf>

Steps in Cloning:

1. Eggs are collected from donor cows (from an abbatoir or donor animals).
2. Eggs are cultured for 18-20 hours.
3. The maternal DNA is removed.
4. The somatic cell is place next to the cell cytoplasm.
5. The somatic cell and cell cytoplasm are electrofused.
6. The embryo is created from the somatic cell and cell cytoplasm from a resistant animal.
7. Activation (similar to the actions of the sperm).
8. Cloned embryos are cultured for 7 days.
9. Transfer of embryos into surrogate mother.
10. Pregnancy diagnosis using ultrasound.
11. Cloned offspring of somatic cell donor (term delivery 280 days).

Marking the Genome

DNA – deoxyribonucleic acid – is the basic building block of life. It contains all of the genetic material that is passed on from one generation to the next. Using DNA, scientists can determine the sex of an embryo. Efforts are also being made to find genetic markers for profitable traits in cows. One day, for instance, an embryo might be able to be tested for high milk and component production, based on its DNA. Health traits could potentially be ‘marked’. Genetic marking involves finding the specific location of the genes that have the genetic material that results in the expression of a certain trait. This is a very exciting and ever-growing field of scientific research.

DETECTING PREGNANCY

Regardless of method of breeding, it helps farmers to know if their cows are pregnant or not. There are a couple of methods of determining whether or not a cow is pregnant:

Palpation – A hand inserted in the rectum can feel the uterus and ovaries from above, and determine changes in the organs that are signs of pregnancy, such as continued follicle development. A cow must be at least 35-40 days pregnant before palpation can be a reliable method of pregnancy detection.

Ultrasound – Similar to palpation, a hand, holding the ultrasound wand, is inserted into the rectum of the animal. Sound waves from the ultrasound bounce off of the uterus and result in a picture forming on the ultrasound screen. A veterinarian can look at the fetus to determine the sex of the fetus. On farms, developing fetuses can be detected as early as about 25 days into pregnancy. When the fetus gets a little older (i.e. 60-90 days) then ultrasound can be used to determine the sex of the developing fetus.

Laboratory testing – Progesterone levels can be measured in the milk and blood of animals to detect the estrus and pregnancy cycles. Low levels indicate a normal estrous cycle (no pregnancy) and high levels indicate pregnancy. This testing can be done earlier than the other tests. Other hormone levels can also be measured to determine pregnancy during the first three months of pregnancy.

Gestation

This is the period of time when a cow is pregnant. The gestation period of dairy cattle is 282 days on average. Cows usually continue milking throughout their gestation period until they have been milking for 305 days or a couple of months before they are expected to calve again.

Sometimes there is a problem during pregnancy that stops the embryo or fetus from developing and prematurely ends gestation.

Abortion is when a dead fetus is passed out of the uterus before the normal birth is due.

Sometimes a fetus ceases development but is not passed through the uterus. Instead, it dries up and stays

there as a mummified fetus until it is removed. A cow carrying a mummified fetus will usually show anestrus as her body will 'think' it is still pregnant.

Reproductive failure during the gestation period could have a variety of different causes:

- 'Normal' – Up to 40% of embryos do not develop as a fetus. This could be because it is not developing properly or because twins are developing and the cow's body rejects the twins early inside the uterus.
- Infection – The embryo/fetus is susceptible to several diseases such as Bovine Viral Diarrhea (BVD), Infectious Bovine Rhinopneumonitis (IBR) and Leptospirosis. Diseases such as these could cause the fetus to stop developing and then be aborted.
- Stress – Transportation, high temperatures, sickness of the pregnant female, or poor nutrition could all stress the fetus enough to cause abortion.

Once an animal aborts, it is helpful for a veterinarian to examine the fetus and placenta so that further abortions in the herd can be avoided (in case it is caused by a disease). Many diseases can be prevented by vaccinating animals so that they do not become infected in the first place.

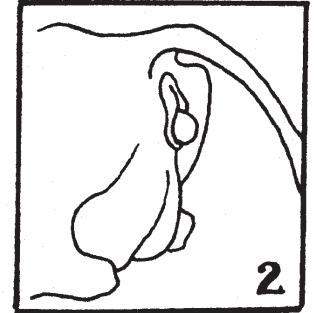
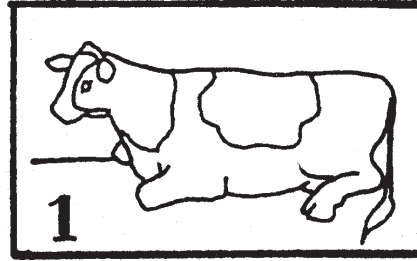
LATE GESTATION CARE

There are several things that can be done to help ensure a healthy calf is delivered and that calving related diseases in the cow are avoided as often as possible.

1. **Close observation** – Know the animal's due date and its expected behaviour during birthing so that you know when it is time to call for help. Trying to assist the calving cow too early can cause harm, but arriving to help in time can increase the chances of survival for both the cow and calf.
2. **Clean birth area** – Prior to calving, the cow should be put in a clean dry area that provides good footing. This helps to prevent infection in both the cow and calf.
3. **Gentle assistance** – Help the cow calve, but only if she needs it.
4. **Selective breeding** – Some sires produce offspring that are smaller and easier to deliver and can be used in breeding programs. Often, dystocia (difficult birth) is caused by a fetus that is too large to fit through the birth canal easily, so selecting for smaller calves may prevent many problems.

CALVING

Calving refers to the birthing process, whereby the fetus makes its journey from the protected environment inside the uterus of its mother into the outside world. When a calf is born, it stops receiving oxygen and nutrients from its umbilical cord and starts to breathe and eat for itself.



The Calving Process

Calving involves three stages, **pre-calving**, **calving** and **post-calving**.

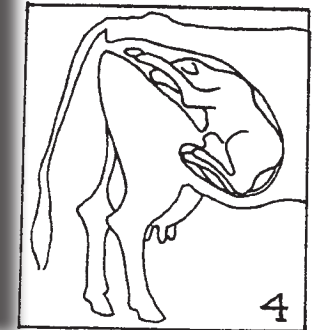
Stage 1 – Pre-calving (Labour)

- Lasts 2- 6 hours.
- Contractions begin. Contractions squeeze the muscles in the uterus to push the calf out.
- The calf changes position, turning so that it heads towards the birth canal.
- 'Labour' means work – the cow's body is preparing to calve.

Before Calving Starts

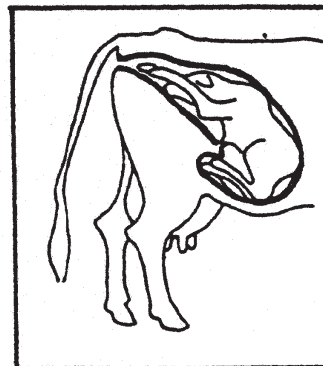
Just before a cow calves, she:

- Stops eating.
- Becomes restless.
- Isolates herself from other animals.
- Lies down and gets up a lot.
- Raises her tail.
- Discharges a thick, clear mucus from her vulva.
- Tries to urinate often.

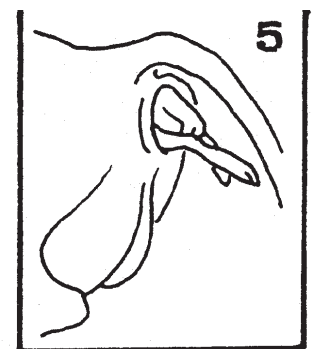


Stage 2 – Calving

- Calf enters the birth canal.
- Contractions get stronger and closer together.
- Cow strains to push out the calf.
- The front feet and muzzle appear.
- The rest of the calf appears and slides out easily.
- Usually lasts two hours for cows and three hours for heifers.

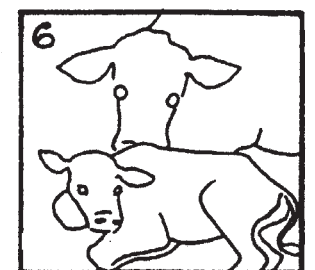


Normal Position



Stage 3 – Post-calving (Delivering the Placenta)

- The cow discharges the placenta, or afterbirth, within 12 hours of calving.
- If the placenta is not expelled it could be due to a difficult calving or a poor diet. This is called a **retained placenta** and can cause infections or make it harder for the cow to get pregnant again. If a cow has a retained placenta, it is time to call the vet!



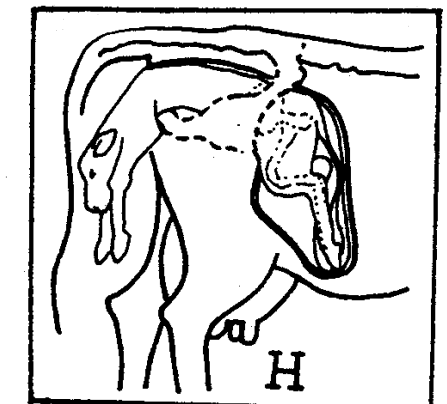
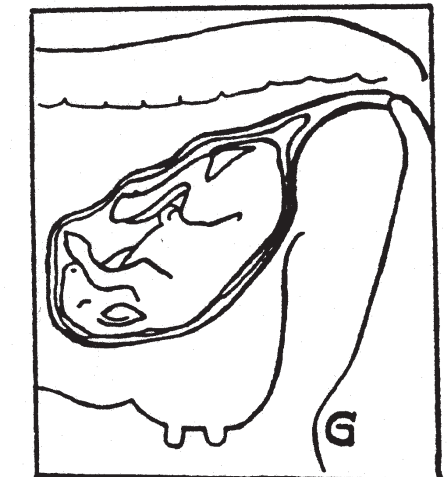
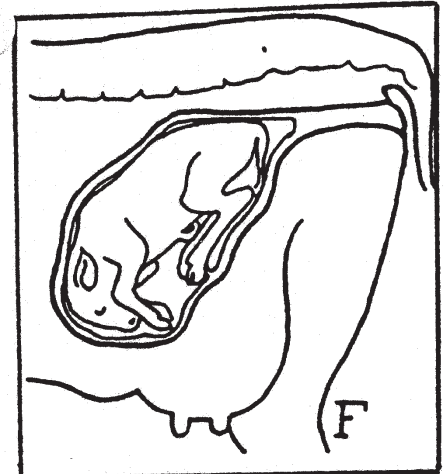
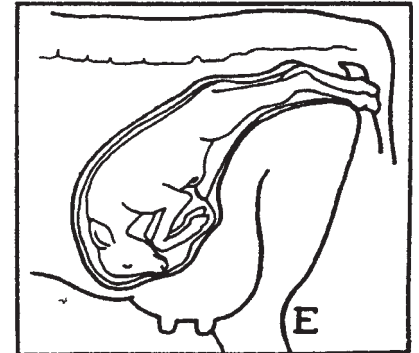
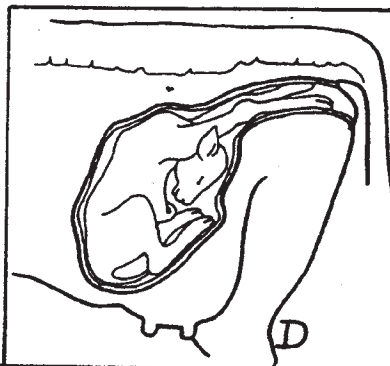
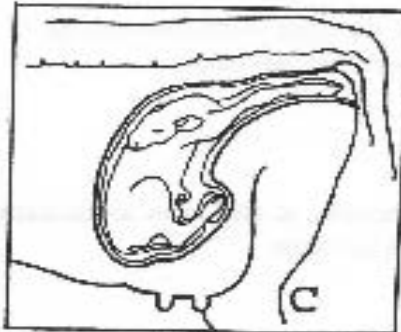
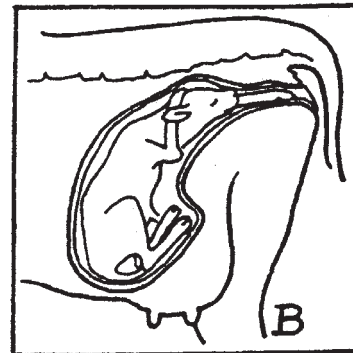
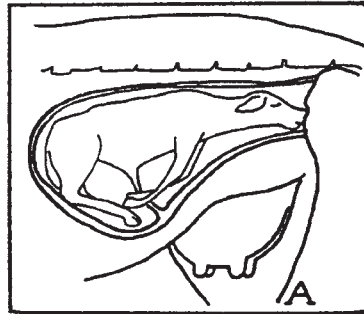
PROBLEM CALVINGS

Dystocia (Difficult Birth)

This occurs when the fetus does not come through the birth canal easily. This could be because the fetus is too large for the birth canal, or because the fetus is in an abnormal position. Dystocia can result in a sick cow and/or a fetus that is stillborn (dead at birth) or weak.

The normal position for the calf at calving is facing the birth canal, with the front feet entering the birth canal first, followed by the head, which rests on the front legs. However, calves may be situated in these other positions:

- A. Head first with one or both legs bent backward.
- B. Head and one leg first, with the other leg crossed over their neck.
- C. Front feet first with the head twisted backwards.
- D. Front feet first with the head bent down between the front legs.
- E. Breech, backwards with the hind feet first.
- F. Breech, with the rear legs tucked under the calf's body.
- G. Breech, upside down, feet facing up.
- H. Hiplock – the calf is stuck at the hips.



When you need to get help...

During Stage 2 of Calving, you may need to give or get assistance if:

- It lasts longer than two or three hours.
- The placenta or water bag is showing for two hours.
- The cow keeps straining but you can't see any part of the calf.
- The cow is straining hard, but not making any progress in having the calf.
- Part of the calf, other than the front feet, appear or can be felt at the start of Stage 2.

Checking for Problems

The two most important things to remember when palpating a cow are sanitation and lubrication. Clean the cow and yourself with warm soapy water and lubricate your arm with soap or mineral oil. Slide your hand into the cow's vagina to check on the progress of calving. If it is hard to get your hand in, stop. Do not force it because you may cause further complications or injury to the cow or calf.

When you feel the orientation of the calf, you can make the decision to either call the vet or try to move the calf yourself.

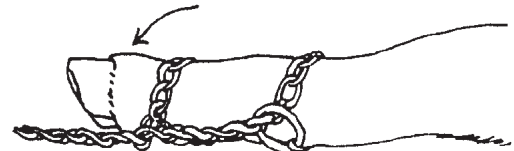
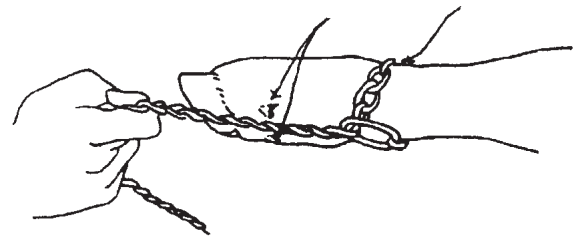
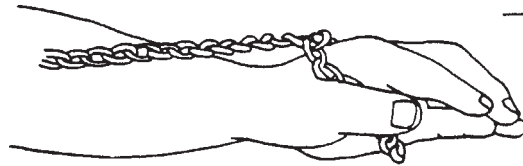
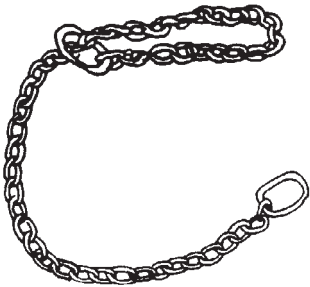
Repositioning the Calf

Calves can be delivered in the breech position with the back legs sticking out, but all other unusual calf orientations require repositioning the calf so that it can be delivered through the birth canal. There are some things to remember to make it easier to reposition a calf:

- Correct the head first, then the feet.
- If you are moving the feet of the calf around, cup them in your hand so they do not tear the inside of the uterus.
- Reposition between contractions so that you do not hurt the cow, the calf or yourself.
- If you have tried for 15 to 20 minutes to reposition the calf without success, STOP and call the vet.

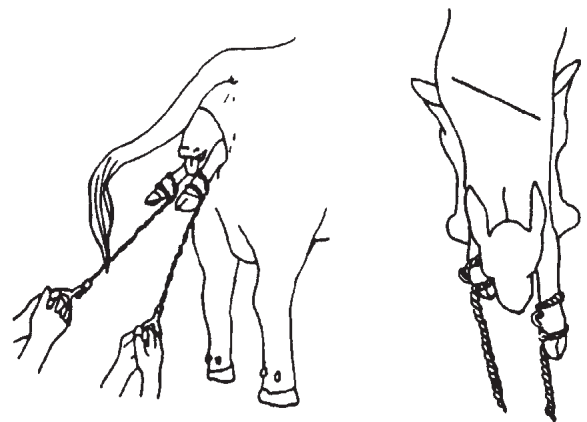
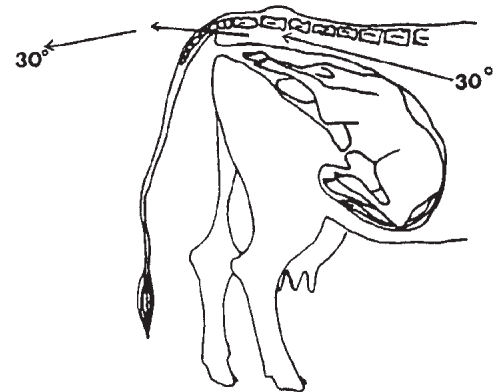
Calving Chains

The ideal way for a cow to calve is to do it naturally, on her own. However, often cows need help to get the calf out. You could use a calf puller or calving chains to give the cow a little help.



Steps to follow when using calving chains:

1. Disinfect the chain.
2. Make a loop in the calving chain.
3. Slip the loop over the calf's dewclaws.
4. Make a half hitch in the chain between the dewclaws and the hoofhead.
5. Pull up 30° and down 30° from the ground and the ceiling. This angle works naturally with the cow's body. Work with the cow and only pull when she is pushing.
6. Alternate pulling on each leg a few centimetres at a time. This keeps the calf's hips and shoulders at an angle so that the calf passes easily through the pelvis.



Double Trouble!

Twins may be exciting for people, but they are often a big disappointment on the dairy farm. Twins are often difficult for the cow to give birth to, increasing the chance of complications, and unless they are both the same sex, they are of little value to the farmer. When the twins are a heifer and a bull, hormones pass between their birthing sacs in the uterus and give them a combination of both male and female sex characteristics. Almost all of the time, this means that the female is a freemartin (an unbreedable female born as a twin with a male).

NEWBORN CALF CARE

There are a few things that need to be done as soon as a calf is born.

It's Time to Take a Breath!

The first step is to make sure the calf is breathing. Clear any membranes off of its nose and inside its nostrils to help it breathe better. You may need to tickle its nose with straw to help it start to breathe, especially if its mother has not started to lick it off yet. Sometimes calves have problems breathing because they still have fluid in their lungs and throat. After all, they have been floating around in a liquid for 9 months! If the calf is having trouble breathing, you can lift it up by its hind legs so that its head is off the ground. Gently swing the calf from side to side. This helps to drain the mucus out of its lungs so that it can breathe.

If the calf still is not breathing, you can try rescue breathing for it. Put your mouth over the calf's nostrils and blow gently. Blowing too hard could burst a calf's lungs.

Navel Treatment

Dipping the calf's navel in an iodine solution will disinfect the umbilical cord area and help to prevent infections. It takes a few days for the umbilical cord area to dry up and heal over, so disinfection and a clean, dry place to lie down are very important for newborn calves.

Colostrum – The Super Drink!

Colostrum is the first milk that a cow gives after she calves. It contains a lot of anti-bodies that help the calf fight germs.

It is ideal to make sure the calf gets at least four litres of colostrum within 30 minutes after birth, and an additional two litres within 8 hours of birth. This amount varies with the size of the calf, as a smaller breed, like a Jersey, will only need three litres of colostrum initially. Timing is important because after about 24 hours, the calf cannot absorb the antibodies in colostrum anymore.

(More information on feeding colostrum is available in the Nutrition section of this 4-H Dairy Member Project Guide.)

Identify the Calf

Once you have a healthy calf on the ground, it is important to make a record of its birth date and parents – kind of like a birth announcement for cows!

Maintaining accurate calving and parentage records is important to track the following information: where animals originate from when they are sold (what farm and where it is located in the world), on-farm management, national health programs, registrations and evaluations. If two calves were born on the same day and they got mixed up, hair samples with their DNA would have to be sent away to figure out which one was which. This is more costly and confusing for the farmer, so it is best to keep everything identified from the very beginning.

When to Call a Vet:

- You see a lot of blood in the discharge before or after delivery.
- You only feel a tail, which means that the calf is in breech position and twins are a possibility.
- The discharge from the vagina has a foul odour.
- The udder on the cow seems to be getting smaller rather than larger.
- The cow has a uterine torsion. This is hard to diagnose, but a cow will stay in Stage 1 for a long period of time without dilating.

Tagging

Tags are an important part of the Canadian Quality Milk Program through Dairy Farmers of Canada. This program regulates milk production to ensure food safety.

Newborns of all dairy breeds in Canada must be tagged using the national ID system. This applies for both registered and non-registered animals. The national identification number corresponding to the tag is assigned to that animal and its farm of origin.

This system includes tags that can be read three ways:

1. **Radio Frequency ID (RFID)** – The front of the tag contains a microchip button with a small panel tag on the back. Information contained on the microchip can be retrieved by wand or portal at an abattoir or sales barn.
2. **Bar code**
3. **Visual Identification**

The tag that does not have the RFID microchip is called the security tag. It has the bar code and large front and back panels. Both sides of tags have the national ID number printed on them and the panel tags have a different within-herd management number for convenient use on a daily basis.

Male calves that are destined for slaughter may be tagged with a 'beef' tag approved by the CCIA (Canadian Cattlemen's Identification Agency). These tags are a single RFID yellow button tag.

Animals that were born before this system came into place and were identified by sketches, photographs, or tattoos can be tagged using transition tags. These tags must be ordered so that individual registration numbers can be printed on them. Likewise, lost tags must be replaced and can be ordered with an individual animal's registration and herd management numbers printed on them.

Animals must be tagged in order to participate in cattle shows, be sold or slaughtered.

Calves must be tagged in the first third of the ear, closest to the head so that the tag does not get caught or wiggle around easily. They should also be placed in the upper part of the ear, between the ribs of cartilage. Careful tagging will help prevent lost tags or tags being ripped out - see the diagram on the next page.

Steps to Tagging:

1. **Ensure** you have the right tags corresponding to the animal's registration number and that all tags have the same number.
2. **Depress** the spring clip on the tagger and insert the front part of one of the tags.
3. Put the matching rear panel on the applicator pin.
4. **Rotate** the front bar-coded panel 90° from the left for the left ear and 90° to the right for the right ear for ease of visibility and to properly position the tag and tagger.
5. **Properly restrain** the animal, regardless of age, and tag from the front of the animal, while facing the animal.

Other Identification

There are other ways that animals may be identified on-farm, in addition to the national tagging system. Types of ID include:

- Tattooing
- Branding
- Sketches and photographs
- Other methods of ID that are not permanent (neck chains, tags, straps, transponders)

When registering an animal, you should check with your breed association to find out how calves should be identified.

Tattooing and branding have become more important to all dairy breeds since November 2007. All animals that are exiting Canada to cross the border into the United States must be tattooed or branded with the letters 'CAN' to indicate their country of origin.

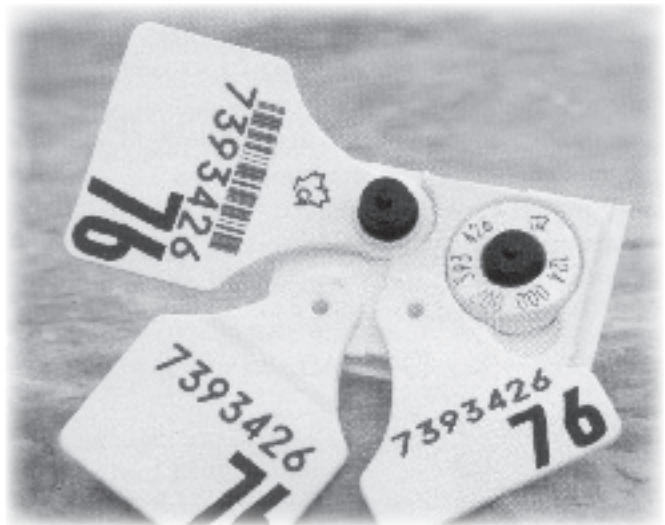
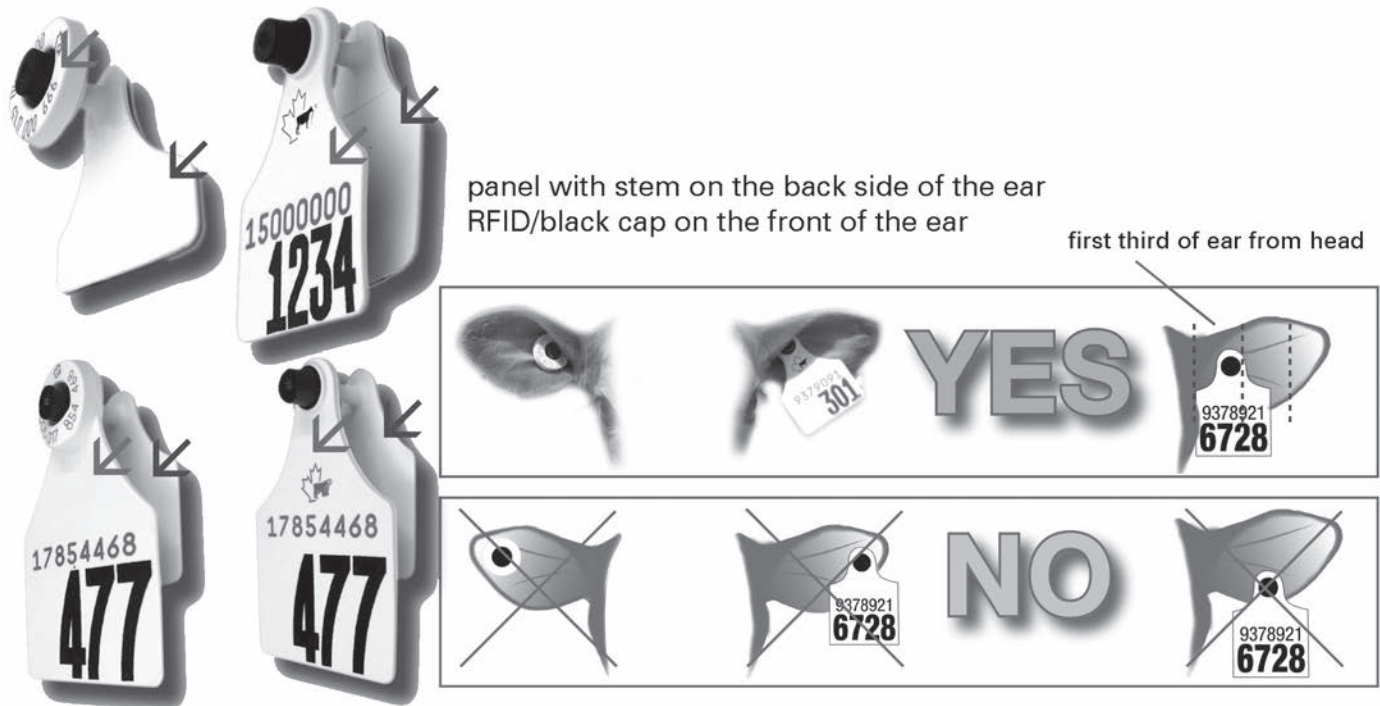


Image: 'One National Tagging System for Canada's Dairy Industry', NLID – National Livestock Identification for Dairy. Revised 2005



Source for tagging information and diagrams: 'One National Tagging System for Canada's Dairy Industry', NLID – National Livestock Identification for Dairy. Revised 2005

COW CARE AFTER CALVING

After calving, cows should be given access to fresh water, good forages and kept in a clean environment to help prevent infection. Sometimes, especially after a difficult calving, problems can occur and need to be treated.

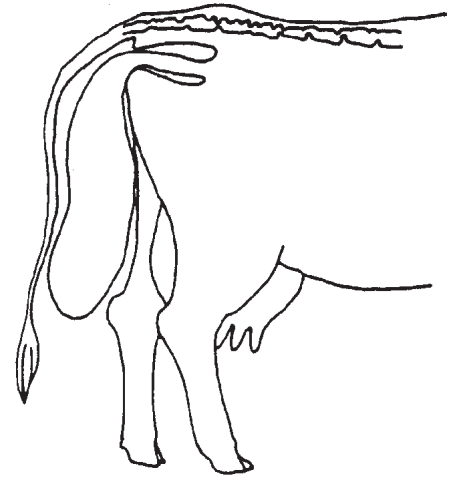
Retained Placenta – If the placenta does not pass from the uterus in a normal amount of time (usually within 12 hours of calving) then she is said to have a retained placenta (RP). This is often caused by dystocia (difficult birth).

Metritis – This term refers to infection in the uterus. It usually delays the onset of the estrous cycle. This disease is often caused by dystocia.

Prolapsed Uterus – After the calf comes out of the cow, a prolapsed uterus occurs when the uterus also passes through the birth canal and hangs from the vulva, inside out. It is usually caused by dystocia or low calcium levels in the cow's blood after she calves.

Nerve or Muscle Damage – Dystocia or slipping injuries can cause nerve or muscle damage.

Milk Fever – This condition is caused by low calcium levels in the blood and muscle tissues. It results in weak muscles and the inability to rise and stand. This condition can occur in animals in early lactation, but onset is most common in the first few hours after calving. While this disorder can be treated by the administration of calcium by subcutaneous, oral, or intravenous means, proper dry cow rations are critical to avoiding this problem



Herd Health – Management Throughout the Reproductive Cycle

Herd health programs have existed for over 40 years to help dairy farms meet their goals. Marketing milk is the number one goal of dairy production, and reproduction of dairy cows is central to this goal. A herd health visit is a regular examination by a veterinarian. The main goals of herd health programs are to:

- Prevent problems instead of having to treat them.
- Organize and plan all health-related procedures and exams.
- Keep records to use in management decisions.

The number one goal of herd health visits on farms is reproduction. Veterinarians may also offer other advice on transition cows, nutrition, housing, vaccinations, and other aspects of farm management.

Typical animals that would be examined during a herd health visit are:

- Pre-breeding cows at 15-45 days after calving.
- Cows bred three or more times.
- Cows with normal discharges from the vulva.
- Cows that have been in calf for one month or more (a pregnancy check examination).
- Cows showing no heats or irregular heats.

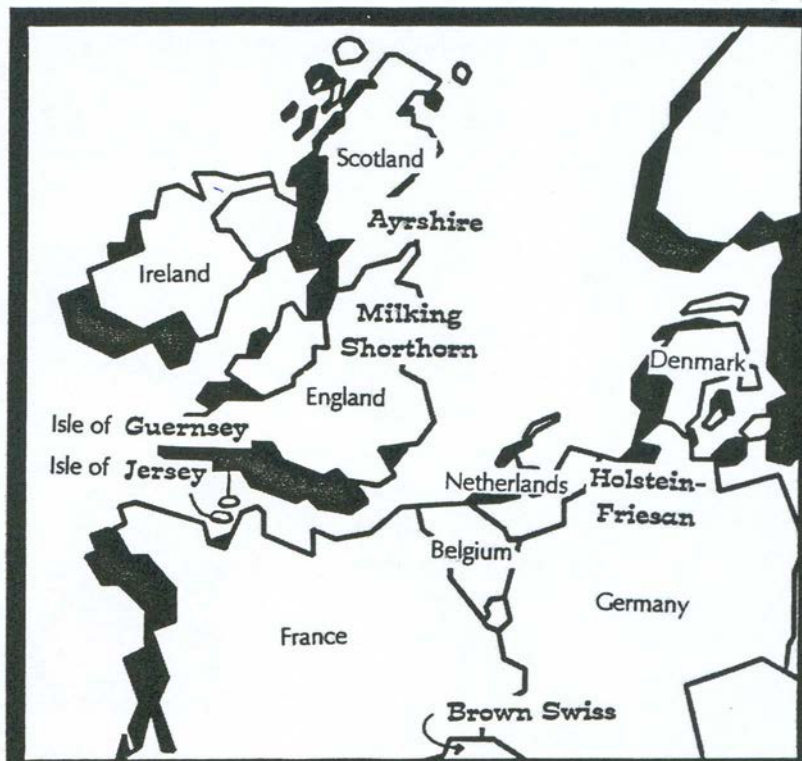
BREEDS OF DAIRY CATTLE IN CANADA

There are seven main dairy breeds in Canada, each with its own historical, production and conformation traits that make it an important part of the dairy industry. These breeds include the Holstein, Ayrshire, Jersey, Brown Swiss, Milking Shorthorn, Guernsey, and Canadienne.

The only one of these breeds that was developed in Canada is the Canadienne. In fact, the Canadienne is the only breed that exists today that was developed in North America. The other dairy breeds all came from different parts of Western Europe and Great Britain.

In Canada, there are approximately 1,040,100 milking dairy cows. The Holstein is the most common breed in Canada, making up 95% of the dairy cattle population. Across Canada, the Ayrshire is the second most prevalent breed, followed by the Jersey.

In Alberta 2009, there were approximately 603 dairy farms. It is estimated that 98% of Alberta's dairy population is made up of Holstein, with the other 2% being predominantly Jersey cows. The farms that record their statistics with DHI, which is thought to be around 75% of the dairy farms, come in having a collective 58,647 dairy cows in the province.



Ayrshire

Descriptive Traits: Ayrshires can be recognized by their red and white markings. They are slightly smaller than Holsteins.

Origin: Ayrshires originated in the mountains of Ayr County, Scotland, an area of very moderate temperatures. While the red and white characteristics of the breed developed by 1800, the breed was not recognized as such until 1814. The first Ayrshires came to Canada in the early 1800s.

Distinguishing Characteristics: Ayrshires are known for their low somatic cell counts. The breed currently has the highest average Breed Class Average (BCA) indexes of any of the dairy breeds – indicating rapid breed improvement. They also have very low birth mortality rates of 1.09%.



Breed Association: The Ayrshire Breeders' Association of Canada, www.ayrshire-canada.ca

Brown Swiss

Descriptive Traits: Brown Swiss are a solid dark brown to silver gray colour with black hooves and muzzles. Mature animals range from a pale whitish brown to a grayish brown colour. They are about the same size as Holsteins, with mature animals weighing an average of 625kg. They are rugged in nature.

Origin: Brown Swiss are the oldest of the dairy breeds, having descended from cattle in Switzerland from before historic records were available. There has been little introduction of outside blood, resulting in a pure breed with distinctive characteristics.

The first animals were brought to Canada from the United States in 1888. The original animals were brought as a dual purpose breed into the Eastern townships of Quebec, but North American animals were later developed into dairy animals.

Distinguishing Characteristics: The Brown Swiss are well known for their ruggedness and exceptional feet and legs that are strong and sound. Given their origins in the mountains of Switzerland, they are very adaptable to different altitudes.



Breed Association: In addition to the dairy strain of this breed, there is a beef strain, called Braunvieh, developed in Canada. Because Brown Swiss and Braunvieh share the same genetic makeup, they are included in the same breed association: The Brown Swiss and Braunvieh Association of Canada. Five provincial associations also exist. www.browncow.ca

Canadienne

Descriptive Traits: Mature cows are usually a dark brown or black colour, but can also be light brown or reddish. They are lighter along their toplines, around their muzzles, and around their udders. The skin on their body usually has black pigment. Calves are born a light brown colour. Mature cows are about the same size as Jerseys, weighing 450kg to 500kg. Newborn calves weigh approximately 30kg.

Origin: This breed is the only dairy breed to have been developed in Canada, or any of North America. Its descendants came from France in 1608 to 1610. Since there were so many of them during the mid 1800s, the Canadian Parliament discouraged people from breeding them, so by 1880 there were very few in existence. In 1886 a herd book was established to help maintain the breed. In the 1970s Brown Swiss were introduced to the breed to improve milk quantity, but was stopped to prevent the breed from complete extinction. To help maintain the breed, the Ministry of Agriculture established a support program, called Project Embryo Plus. This program involves flushing 100% purebred females to 100% purebred males.



Distinguishing Characteristics: The unique history of this breed resulted in its being granted official heritage status by the Quebec government in 1999. It is known as a hardy animal that can thrive in low management, pasture grazing systems.

Breed Association: The French Canadian Cattle Breeders' Association formed in 1895. Since this breed is considered to be a Rare Breed, information is also available from Rare Breeds of Canada.

Guernsey

Descriptive Traits: Guernseys are a golden fawn colour with white markings. The shade of fawn can range from very light brown to brownish red. They are medium-sized cattle, about the same size as the more common Ayrshire, with mature animals weighing from 550kg to 700kg.

Origin: Guernsey cattle were developed on the Isle of Guernsey, in the English Channel off the coast of France. The breed was developed by monks who brought cattle with French bloodlines to the Island. In 1819 a law was passed on the Islands prohibiting live cattle from being imported to the Islands, resulting in a pure population of the breed on the Isle of Guernsey.

The first Guernseys arrived in Canada by accident when a ship heading for the New England states was forced to land in Nova Scotia. The residents were impressed by the animals, and so in 1878, the first official importation of Guernseys to Canada was made by the Prime Minister, Sir John Abbott. The breed started in the Maritimes and traveled over land to other parts of the country.



Distinguishing Characteristics: Guernseys are most well-known for the distinctive golden colour of their milk, which is caused by a very high content of Beta Carotene.

Breed Association: Canadian Guernsey Association. www.guernseycanada.ca

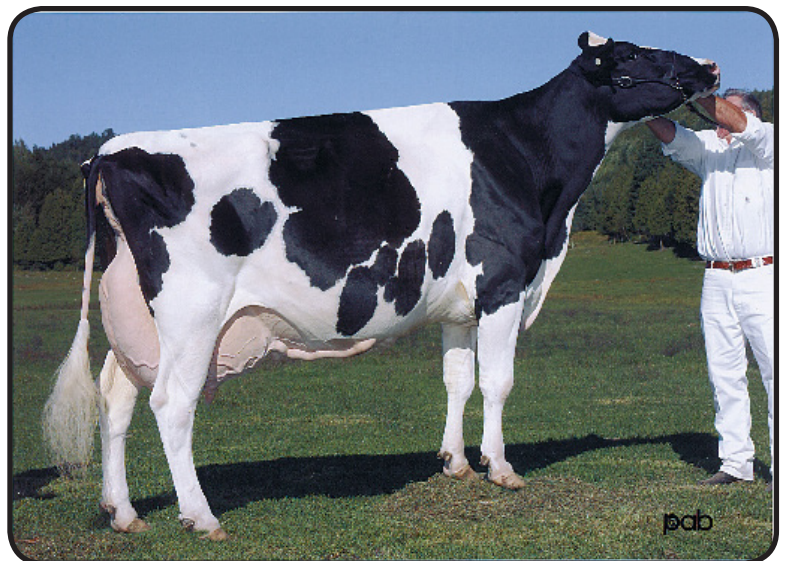
Holstein

Descriptive Traits: Holsteins are usually black and white, although some can be red and white, or carry red and white genes (called red carriers). Adult females weigh approximately 625kg and are, on average, 58 inches tall at the shoulder. When they are born, calves weigh about 40kg.

Origin: Holsteins were imported from Holland (now called the Netherlands) in the 1880s as Holstein-Friesians. Today, 95% of the dairy cattle in Canada are Holsteins, with provincial organizations throughout the country, as well as the national organization that maintains the breed's herd book, Holstein Canada.

Distinguishing Characteristics: Holsteins give the highest volume of milk, fat and protein of any of the dairy breeds.

Breed Association: Holstein Canada.
www.holstein.ca



Jersey

Descriptive Traits: Jerseys range from light fawn to dark brown in colour, with or without white markings. They are also characterized by their dark hooves and muzzles. Jerseys are the smallest of the common dairy breeds, weighing 400kg to 500kg as mature animals.

Origin: Jersey cattle were developed on the Isle of Jersey, in the English Channel off the coast of France. Early ancestors are believed to have originated in Africa, which explains the high tolerance to heat and humidity that the breed has developed. In 1819 a law was passed on the Islands prohibiting live cattle from being imported to the Islands, resulting in a pure population of the breed on the Isle of Jersey.

Jerseys were first brought to Canada in 1868. They came to Quebec and the American Jersey Cattle Club processed registrations until a Canadian Association was founded in 1901 and started its own herd book in 1905. The breed was very popular in the 1950s and 1960s when there was an All-Jersey milk program, but popularity declined when this program ended. Multiple Component Pricing has helped to renew Jersey's popularity.



Distinguishing Characteristics: Jerseys are well-known for having the highest percentages of fat and protein in their milk. Their small size results in easy calvings.

Breed Association: Today, while provincial and regional organizations exist in Atlantic Canada, Ontario, Quebec, and the Maritimes, the national breed association is known as Jersey Canada. www.jerseycanada.com

Milking Shorthorn

Descriptive Traits: Milking shorthorns are red and white. Their markings can vary from an almost solid roan colour to a very speckled roan and white. They are medium-sized animals.

Origin: The breed was established in the 1700s in Northwestern England. In Canada, the breed was known as Dual Purpose Shorthorns until the early 1990s when the name was changed to Milking Shorthorns to reflect the dairy genetic focus of the breed.

Distinguishing Characteristics: Shorthorns are well known for their feed efficiency, maternal instinct, soundness and longevity.

Breed Association: The breed is represented in Canada by the Canadian Milking Shorthorn Society. www.cmss.en.ca



COMPARING BREED PRODUCTION

The chart below compares production levels of the Canadian breeds of dairy cattle based on 2006 production numbers:

Breed	Number of Records	Milk (kg)	Fat (kg)	Fat (%)	Protein (kg)	Protein (%)	BCA		
							Milk	Fat	Protein
Ayrshire	9,323	7,423	293	3.96	246	3.32	213	204	214
Brown Swiss	1,528	8,064	326	4.06	278	3.46	208	209	205
Canadienne	203	5,412	228	4.24	193	3.60	188	177	196
Guernsey	422	6,540	296	4.55	224	3.43	198	179	190
Holstein	264,903	9,677	357	3.71	307	3.18	211	209	210
Jersey	8,809	6,331	304	4.83	238	3.77	211	187	209
Milking Shorthorn	230	6,552	238	3.65	214	3.29	236	213	236

Source: Canadian Dairy Information Centre, www.dairyinfo.gc.ca

REGISTERED OR GRADE ANIMALS

A registered animal is one that has parents who are also registered and are of the same breed. A registered cow has official identification and papers to prove her parentage, just like a person has a birth certificate. Registered cattle have higher sale values than grade animals of comparable quality because they are thought to be more valuable to a dairy herd.

A grade animal has parents who are not registered. Grade cattle have no official family trees.

Crossbred Animals

Crossbred animals are those of mixed breed parentage. The sire and dam are not the same breed. These animals do not have as high of sale value as registered animals, but many farms have started to use them because they reduce the level of inbreeding in a herd and as such, have an advantage in increased “heterosis”. Heterosis refers to the increased performance of progeny compared to what is expected based on the average of its parents. An example of a crossbred animal would be the result of a mating of a Holstein cow with a Brown Swiss bull.

Genetic Improvement

Genetic improvement is a long name for a simple idea: building better cows. When farmers breed a heifer or cow, they want the resulting calf to be better than her parents. There are several traits that farmers want to improve in their animals, such as:

- Milk production
- Protein production
- Fat production
- Conformation
- Longevity
- Somatic Cell Count
- Other health traits

Since improving traits helps farmers earn more money in the future, it is very important to select the right bull to breed to each cow in the herd. It is kind of like matchmaking for cows!

Inheriting Genes

Genes are inherited. That means they are passed on from parents to their offspring. Cattle (and people too!) get half of their genes from their mother (dam) and half from their father (sire).

Farmers hope that the best traits of the dam and the sire will be passed down. This does not always happen though. Some genes pass down from one generation to the next easier than others do. This is called heritability. Highly heritable genes are easy to pass on to offspring, while less heritable genes are more difficult to pass on.

In general, some traits are more easily inherited than others:

Highly heritable

- Percentage of fat and protein in milk
- Size as adults

Moderately heritable

- Milk yield
- General appearance
- Mammary system
- Milking speed

Slightly heritable

- Life span
- Strength of feet and legs
- Fertility
- Calving difficulty
- Resistance to mastitis

The charts below show the heritabilities of different production, functional and type traits of different breeds of dairy cattle that are used in genetic evaluations:

Production Trait	HO	AY	JE	BS	GU	CN	MS
Milk Yield	41	38	44	41	41	42	42
Fat Yield	34	34	39	36	35	38	40
Protein Yield	37	37	41	38	38	40	41
Fat Percentage	Not Directly Used – Literature estimate is ~50%						
Protein Percentage	Not Directly Used – Literature estimate is ~50%						

Major Type Trait	HO	AY	JE	BS	GU	CN	MS
Conformation (Final Score)	26	23	23	23			
Rump	23	24	17	20			
Feet & Legs	15	21	13	17			
Mammary System	25	22	20	21			
Dairy Strength	36	37	32	35			

Functional Traits	HO	AY	JE	BS	GU	CN	MS
Somatic Cell Score	24	26	27	26	28	27	33
Lactation Persistence	40	42	40	42	39	42	43
Herd Life	10						
Calving Ability	6						
Daughter Calving Ability	6						
Milking Speed	21						
Milking Temperament	8						
Daughter Fertility	7						

Descriptive Type Trait	HO	AY	JE	BS	GU	CN	MS
Angularity	26	26	26	26			
Stature	53	55	46	50			
Height at Front End	26	26	26	26			
Chest Width	22	25	17	21			
Body Depth	32	32	32	32			
Loin Strength	25	22	22	22			
Pin Width	34	30	21	26			
Pin Setting (Desirability)	9	20	4	12			
Rump Angle	37	35	29	32			
Bone Quality	30	34	15	25			
Foot Angle	11	8	6	7			
Heel Depth	8	8	8	8			
Set of Rear Legs (Desirability)	5	11	7	9			
Rear Legs Side View	24	18	14	16			
Rear Legs Rear View	13	13	13	13			
Udder Depth	42	32	30	31			
Udder Texture	14	13	12	13			
Median Suspensory	14	17	19	18			
Fore Attachment	28	23	22	23			
Fore Teat Placement	31	17	22	20			
Teat Length	29	29	29	29			
Rear Attachment Height	23	19	22	20			
Rear Attachment Width	20	19	18	19			
Rear Teat Placement	29	24	29	26			

Source: 'Heritability Estimates used for Genetic Evaluation in Canada', Canadian Dairy Network, 2007

PARENT AVERAGES

How do you know how much milk a young calf will produce when she gets older? While it is impossible to know for sure, you can predict her production and conformation traits by looking at her parent averages.

Cows have records on their milk production and bulls have records on how their daughters have produced. You can add up the production numbers from the calf's dam and sire, then divide this total by two. This gives a Parent Average for the calf. The Parent Average predicts what the calf will be like when it grows up.

How do you tell if a calf has a good Parent Average? Look for lots of pluses (+) beside her numbers!

A parent average example:

Dam: Clover				
	Milk	Butterfat	Protein	
	+2162kg	+81kg	+78kg	
Sire: Freddie				
	+1150kg	+69kg	+42kg	
Total	+3312kg	+150kg	+120kg	(sum of sire & dam numbers for each trait)
÷ 2	+1656kg	+75kg	+60kg	= Parent Averages for the offspring of Clover and Freddie

Toolkit for Genetic Improvement

Now that we know what traits are heritable, how do we figure out how to use them to improve our herd?

The first step in mating cows with appropriate bulls is to know as much information as possible. Knowing more information about your cows will give you a better idea of what traits need to be improved. Types of information available are:

- **Registration** – Registered cows have a complete family tree. You can study their parentage and use it to make breeding decisions.
- **Milk Production Records*** – Milk recording companies (DHI and Valacta) record milk production for dairy herds. These records are used to calculate genetic evaluations. You can use these evaluations to get rid of genetically lagging cows and to find your best cows. Milk records also contribute to bull proofs, based on the production levels of a bull's daughters.
- **Classification*** – Classifiers come to your farm to rate the conformation (body type) traits of milking animals. This classification rating makes up a cow's genetic record for conformation.
- **Artificial Insemination Units** – AI allows a bull's superior genetics to reach a greater number of cows than by natural service. AI units seek out new bulls, obtain information about existing bulls, and offer advice to farmers.
- **Bull Proofs and Cow Indexes** – The facts and figures in genetic indexes and bull proofs are excellent tools for improving genetics. From these numbers you can make concrete decisions about the genetic worth of one animal over another. The Canadian Dairy Network is the database holder for this information for all dairy breeds in Canada.

*More information on Milk Production Records and Classification can be found in the "Business Section" of this 4-H Dairy Member Project Guide.

REGISTRATION

There are many benefits to registering animals on your farm:

- Increased resale value of your animals.
- Know where your animals came from and who their parents are.
- Helps you to make future breeding decisions.

When animals are registered or recorded as a percentage purebred with their breed association, a pedigree is generated. A pedigree is a family tree. A registration paper shows basic pedigree information, but more detailed pedigrees, containing production, functional and type trait information for several generations can also be obtained. Many breeds even have pedigree information available on their websites!

It is important to know how to read a pedigree so that it can be used as a tool for genetic improvement. The chart below outlines some of the key information in a Holstein pedigree. Other breeds' pedigrees contain similar information.

Reading Official Pedigrees

REGISTRATION INFORMATION			
		country (3 digits) + sex (1 digit) + registration number	
PG	purebred by grading up	IC	irregular colour (recorded level only)
MB	multiple birth	GT	genotyped
ET	embryo transfer (regular)	CAN	country code
ETM	embryo transfer manipulation (split or clone)	F, M	sex (male or female)
ETA	embryo transfer adult clone	B:	birthdate
B&W	black & white	*BLC	carrier of BLAD
R&W	red & white	*BLF	non-carrier of BLAD
B/R	black / red	*MFC	carrier of Mulefoot
AW	all white	*MFF	non-carrier of Mulefoot
AB	all black	*DPC	carrier of DUMPS
AR	all red	*DPF	non-carrier of DUMPS
		*CVC	carrier of CVM
		*CVF	non-carrier of CVM
		*XIC	carrier of Factor XI
		*XIF	non-carrier of Factor XI
		*CNC	carrier of CIT
		*CNF	non-carrier of CIT
		*BKC	carrier of black gene
		*BRC	carrier of black/red gene
		*RDC	carrier of red gene
		*RDF	non-carrier of red gene
		*VRC	carrier of variant red gene

ANIMAL NAME	
HOCANF11111111 ET GT B:2004 Apr 01	A
VG-89-3YR-CAN 1*(0/9)	B
MS:89(FA:9 RAH:7 RAW:9) F&L:89 DS:90 R:90	C
CAN-GEV Aug*09 74%Rel GLPI+2083/99%	D
KG M+1438/95% F+47/94% %F-0.04	E
SCS 2.74 P+44/97% %P-0.02	F
CAN-GEV Aug*09 73%Rel Conf+15/99%	G
MS+13 F&L+9 DS+12 R+12	H
02-05 305 12047 441 3.7 409 3.4	I
365 14244 528 3.7 489 3.4	
BCA 276 271 294	
05-02 P114 14403 608 4.2 452 3.1	
PBCA 289 330 288	
2 LACT: 21644 823 3.8 713 3.3 KG	
AVG BCA: M283 F301 P291	
RES. ALL-CANADIAN JR.3-YR 2007	
ALL-ONTARIO JR.3-YR 2007	
RES.GRAND 2009 QC EXPO	
RES.INT. 2007 ON SUMMER	
3RD JR.3-YR 2007 ROYAL	
1ST JR.3-YR 2007 ON DISCOVERY	
Progeny Data: 0EX 5VG 2GP 0G 0F	
7 DAUS ME AVG: 14121 501 3.5 449 3.2	
AVG BCA: M267 F256 P272	

INDEX TYPE	EBV	Estimated Breeding Values (CAN)
	GEBV	Genomic Estimated Breeding Value
	MACE	Multiple-Across Country Evaluation (Int.)
	GMACE	Genomic Multiple-Across Country Evaluation (Int.)
	PA	Parent Average (if no official index)
	GPA	Genomic Parent Average

CLASSIFICATION / STAR BROOD STATUS					
VG	89	3YR	CAN	1*	(0/9)
final class	final score	age at classification	country	# of stars	natural / ET progeny
MS:89	(FA: 9)	RAH: 7	RAW: 9)	F&L: 89	DS: 90 R: 90
mammary system	fore attachment	rear attachment height	rear attachment width	feet & legs	dairy strength rump

GENETIC INDEXES				
CAN	GEV	Aug*09	74%Rel	GLPI+2083/99%
country of index	genomic estimated breeding value	month/year of index	% reliability	genomic LPI index / % ranking
KG	M+1438/95%	F+47/94%	%F-0.04	
weight	milk / % ranking	fat / % ranking	% fat	
SCS 2.74	P+44/97%	%P-0.02		
somatic cell score	protein / % ranking	% protein		

CAN				
country of index	genomic estimated breeding value	Aug*09	73%Rel	Conf+15/99%
		month/year of index	% reliability	conformation / % ranking
MS+13	F&L+9	DS+12	R+12	
mammary system	feet & legs	dairy strength	rump	

LACTATION RECORDS					
02-05	305	12047	441	3.7	409 3.4
age at calving	days in milk	milk volume	fat volume	% fat	protein volume / % protein
BCA	276	271	294		
Breed Class Average	milk BCA	fat BCA	protein BCA		

05-02					
P114	14403	608	4.2	452	3.1
age at calving	days in milk	milk volume	fat volume	% fat	protein volume / % protein
PBCA	289	330	288		
Projected BCA's	milk BCA	fat BCA	protein BCA		
2 LACT:	21644	823	3.8	713	3.3
# of records	lifetime volumes	milk volume	% fat	protein volume	% protein
AVG BCA:	M283	F301	P291		
average BCA	milk BCA	fat BCA	protein BCA		

PRODUCTION AWARDS	
Super3	Superior Lactation
high production over at least 3 consecutive lactations	high production in a single lactation

SHOW WINNINGS			
1st	JR. 3YR.	2007	ON DISCOVERY
placing	age class	show year	show name

PROGENY DATA	
Progeny Data: 0EX 5VG 2GP 0F 0P	
# of daughters classified in each class	
7 DAUS ME AVG: 14121 501 3.5 449 3.2	
# of daughters: Mature Equivalent lactation average	
AVG BCA: M267 F256 P272	
daughters average BCA	

The information herein contained is based upon the records maintained by the Holstein Association of Canada. The accuracy of the information is not guaranteed and is subject to correction according to the Association's By-Laws.

RANKING GENES

To make breeding decisions, you must know how good the genes of sires and dams are and be able to compare them to other sires and dams in the breed. A sire's genetic "report card" is called a bull proof. A cow's genetic "report card" is called a genetic index. All of these reports are based on the Animal Model. That means that all of the daughters and other relatives of a sire are compared for type and production each year. These numbers are then used to create both indexes and proofs. Since cow indexes and bull proofs are based on the same numbers, they can be compared directly. This makes decision making much easier!

When looking at different traits on a genetic index, cows and sires that are above average are rated as a "+". Cows and sires that are below average for a particular trait are rated with a "-".

The Canadian Dairy Network (CDN) compiles and publishes indexes and proofs three times per year. Herds can contact CDN to obtain their Genetic Herd Inventory (GHI), which ranks their cows against other cows in Canada. There are several components to the GHI and individual animal indexes:

1. Identification

- Name, registration number, sire short name or registration number, dam registration number, birth date.
- % INBR – The animal's level of inbreeding.

2. Production Record

- Last calving date.
- Days in Milk (DIM) for the current record.
- #HRD – The number of herds a cow has been milked in.
- #REC – The number of production records in the evaluation.

3. Milk, Fat and Protein Index/Proof

- REP – Repeatability – A measure of accuracy of the index (1=low, 99=high). To have a published index a minimum REP of 30 is required.
- % RK – Percentile rank for milk, fat or protein yield. Percentiles refer to the percentage of animals that rank below that animal. For example, a cow in the 80th percentile is better than 80% of the cows of her breed for that trait. She is in the top 20% for her breed.
- MILK, FAT, PROTEIN – Index for milk, fat or protein, in kilogram (kgs). This number is an EBV (Estimated Breeding Value), which is an estimate of the worth of the genetic material of the animal. Half of this genetic material will be passed on to her offspring.
- FAT %, PROT % - Fat or protein in the total milk volume, expressed as being above, or below, average.

4. Type Index
 - REP – Repeatability of the conformation index
 - % RK – Percentile ranking for overall conformation
 - CONF – Cow's index for overall conformation
 - EBVs are also given for Mammary System (MS), Feet & Legs (F&L), Dairy Strength (DS), and Rump (RP)
5. Somatic Cell Score
 - SCS – The genetic evaluation for somatic cell score. Under 3.00 is desirable
6. Lifetime Profit Index (LPI)
 - % RK – Percentile rank for LPI.
 - LPI Code – Indicates that LPI values are based on parent averages (PA) instead of genetic indexes/proofs (i.e. for a heifer that does not yet have her own information).
 - LPI – A genetic selection index provided for bulls, cows, heifers and young sires representing the expected lifetime profitability of future daughters. The LPI combines conformation and the three components of production, durability and health and fertility, into a single value.

BULL PROOFS

Bull proofs contain the same basic information as cow indexes. A bull's proof is based on the results of his daughters.

In January 2008, functional traits for bull proofs started to be expressed as "Relative Breeding Values "(RBVs) whereby the average bull of a given breed is rated 100. Most bulls will range between 85 and 115 for any given functional trait. The only trait that is not expressed as a RBV is Somatic Cell Score (SCS). It is just like the scale for type traits, except for type the average is 0 instead of 100, which is the average, score for SCS.

What are functional traits?

Functional traits are related to animal health and management and can be useful in helping to meet herd goals. Functional traits include:

- Herd life
- Milking speed
- Milking temperament
- Lactation persistency
- Daughter fertility
- Calving ability
- Daughter calving ability
- Somatic cell score

Look for the positive!

Cows and sires who have above average rankings for individual traits are given a “+” score, while those who are below are given a “-” score. If an animal has a score of “0” (zero), it means that it is average for its breed.

There’s a lot of information in there!

Production data in genetic indexes contains over 50 million test day records, dating since the early 1990s. Conformation data is based on first lactation classifications and dates back to 1993 for Holsteins, and the early 1980s for other breeds.

CDN calculates and publishes evaluations for 78 different traits: 20 production, 29 conformation and 29 functional traits.

DEVELOPING MATING STRATEGIES

Mass selection involves mating the best sires to the best cows. That way, poor individuals do not contribute to the next generation of cattle. In simple terms, “breed the best and cull the rest.”

The rate of genetic improvement using this method can vary based on a number of factors:

- Selection intensity (how closely you follow this program).
- Variation and accuracy of records and genetic indexes your decisions were based on.
- Generation interval – Shorter generation time means you get to breed those better genes again faster to better, more up-to-date sires.

Corrective mating involves trying to correct a cow’s faults by breeding her to a bull that is strong in those areas. Usually breeders use this strategy to correct conformation problems. For example, a cow with a poor suspensory ligament in her udder would be bred to a bull proven to produce cows with excellent udders.

While this method usually leads to some genetic improvement, it is important to remember that you cannot change every trait at once. Selecting a few key traits that you want to correct will usually be more successful and make breeding decisions more straightforward than trying to improve 10 traits at once.

LINEBREEDING

Linebreeding, otherwise known as inbreeding, is a mating strategy whereby two closely related members of the same family are bred to produce offspring. It is a common myth that inbreeding always has a negative effect, but many successful breeders have linebred elite genetics to concentrate desirable genes in the progeny. Since the resulting animals with more desirable characteristics do not have as much genetic variation, they are a more uniform group. However, negative traits can be concentrated with linebreeding as well. Heterosis – when the progeny perform better than is predicted from the average of their parents – is decreased with linebreeding. Inbreeding will cause inbreeding depression – a reduction in performance of some traits – just because the animals are inbred. As such, when mating animals, levels of inbreeding depression should be kept low.

Selecting Sires

Once you know how to read genetic indexes you can start choosing bulls to breed to cows in your herd.

Selecting a sire is the most important decision you make to improve the genetics in your herd. If you use bulls with poor genetics than your herd will not improve and will fall quickly behind the rest of the breed.

When picking sires, there are more things to look at than just the “+” and “-” numbers on bull proofs. A couple of important things to pay attention to are repeatability and young sire usage.

Repeatability – Choosing the right bull is a little bit like gambling – there’s always the risk that the traits you are looking for will not be the ones that are passed on. To increase the accuracy of your selections, check out the bull’s repeatability ranking. The higher the ranking, the more daughters the bull has had; therefore; the numbers on the bull’s proof are more accurate. He can repeat the results in breeding after breeding. “Surprises” such as calving difficulties or low component production are less likely to show up in the offspring.

Young Sires vs. Proven Bulls – Young sires are bulls that have not had many daughters. This means that it is harder to judge their genetics. Generally, the repeatability of young sires is 30-40%. To have an official proof, the bull must have a repeatability of 60%. You can estimate how the sire should turn out by adding the genetic index of the bull’s sire and dam together and dividing by two (the parent average).

To get new sires being used and to “prove” more sires, semen companies offer rewards for using young sires. Since their results are not as reliable, it is advisable not to breed too many animals to any one young sire. Using these bulls can be advantageous though, because they offer the newest genetics that are available.

VO-COW-BULARY

A glossary of breeding and reproductive terms

Abortion	The expulsion of a fetus prematurely.
Birth	The act, or fact, or being born.
Cervix	Any neck-like part, as the constricted end of the uterus, joining the uterus and vagina.
Chromosome	One of the rod-like bodies formed from chromatin in the nucleus during cell division, acting as a carrier of the genes or units of hereditary information.
Crossbred	The animal has a sire and dam who are not the same breed as one another.
Dam	The mother of a calf.
Dystocia	A difficult birth; occurs most often when the calf is delivered in an abnormal position.
Embryo	An animal in the early stages of development of the fertilized ovum, prior to implantation to the uterine wall.
Estrus (Heat)	The peak of the estrous cycle, coinciding with ovulation, when a cow can be bred.
Fertilization	To render an ovum capable of growth by fusion with a male gamete (sperm).
Fetus	Developing young in the womb of a cow.
Follicle	A small cavity or sac-like structure within which an ovum develops during the estrous cycle.
Grade	An unregistered animal.
Heritable	Traits that can be passed on from one generation to the next.
Heterosis	The increased performance of progeny, compared to what is expected based on the average of its parents.
Implantation	When the fertilized ovum, now called an embryo, attaches itself to the tissue on the inside of the uterus.
Inbreeding depression	The reduction in performance of some traits caused by inbreeding (linebreeding).
Lactation	The period during which a cow forms and secretes milk.
Linebreeding	A mating strategy whereby two closely related members of the same family are bred to produce offsprings with the goal of increasing the concentration of desirable genetics. Also called inbreeding.

Ovary	The reproductive organ of the cow that produces the eggs and certain sex hormones.
Oviducts	Two slender ducts through which ova are transported from an ovary to the uterus.
Ovulation	To produce and discharge ova from an ovary.
Ovum	A single female reproductive cell, also called an egg; plural is ova.
Palpation	To examine, by touch, using an arm inserted into a cow's rectum.
Placenta	The vascular organ of interlocking fetal and maternal tissue, by which the fetus is nourished in the uterus.
Pregnancy	The condition, or a time, of carrying a developing offspring in the uterus.
Progesterone	An ovarian hormone active in preparing the uterus for reception of the fertilized ovum and sustaining the uterine lining during pregnancy.
Purebred	An animal whose sire and dam are the same breed as one another.
Rectum	The terminal part of the large intestine ending at the anus.
Registered	An animal that has parents who are also registered and of the same breed. A registered cow has official identification and papers to prove parentage.
Reproductive System	The system in which offspring are produced.
Semen	The fluid containing sperm that is produced by bulls.
Sire	The father of a calf.
Sperm	The male-fertilizing fluid contained in semen; the male productive cell carrying one half of the genetic makeup for a cow.
Sire	The father of a calf.
Sperm	The male-fertilizing fluid contained in semen; the male reproductive cell carrying one half of the genetic makeup for a cow.
Ultrasound	The image produced on a screen by bouncing very high sound waves off of the fetus.
Umbilical Cord	The rope-like structure connecting the navel of a fetus with the placenta of the mother.
Uterus	The organ of a cow in which the fertilized ovum is deposited and develops until birth; the womb.
Vagina	The canal leading from the external genital orifice in the cow to the cervix at the opening of the uterus.
Vulva	The external genital parts of the cow that can be seen outside her body.

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References and Resources from the previous 4-H Ontario Dairy Manual.

RELATED ACTIVITIES (SEE LEADER'S GUIDE)

Promoting the Breeds	Breeding	All ages
Reading Genetic Indexes	Breeding	Senior & Junior members
Selecting Sires	Breeding	Senior & Junior members
The Genetic Puzzle	Breeding	Junior members
Cow Mating - You Make the Decision	Breeding	Senior & Junior members
Genetic Improvement	Breeding	All ages
Reading Bull Proofs	Breeding	Senior & Junior members
The Facts of Life	Breeding	Junior members
AI vs. the Farm Bull	Breeding	All ages
Breeding Trivia	Breeding	Senior members
Artificial Insemination Demonstration	Breeding	All ages
Build a Ruminant Reproductive System	Reproduction	All ages
The Successful Calving Board Game	Reproduction	Junior members
Stages of Calving	Reproduction	All ages
Calf Pulling Demonstration Series	Reproduction	All ages
Identifying a Newborn Calf	Reproduction	All ages
Caring for a Newborn Calf	Reproduction	All ages
Making a Calving Diagnosis	Reproduction	Senior members
Dystocia Drama	Reproduction	Junior members

ECONOMIC IMPORTANCE OF THE DAIRY INDUSTRY

Look at Those Numbers!

The Canadian dairy industry proves that farming really is big business! The industry earns **\$4.84 billion** in farm cash receipts each year, and \$11.5 billion in manufacturing sales each year. That means it ranks 4th in Canada for all agricultural sectors, following grains and oilseeds, red meat and horticulture.

The dairy industry creates a lot of jobs. Canada's 14,600 dairy farms create 50,000 on-farm jobs. Another 25,200 jobs are created indirectly through goods and services, which provide supplies and services farms need to operate.

There are about 300 processing plants that generate another 66,600 jobs, both directly and indirectly related to the dairy industry. Processing contributes about **\$10 billion** in sales each year.

A lot of money, and a lot of milk!

The Canadian dairy industry produces 7.6 billion litres of milk per year.

In total, the dairy industry contributes **\$26 billion** in total economic activity related to dairy production and related industries. This economic impact contributes **\$8.3 billion** to the Gross Domestic Product. Milk sales make up about **\$4.2 billion** in sales each year.

The Canadian dairy herd is made up of approximately 1,516,400 head of cattle, of which 1,040,100 are cows.

Provincial Impact – Alberta

In Alberta, there are 17 active processing facilities, ranging from small to large multinational operations. The most recent record from 2005 shows that Alberta's dairy product manufacturing sector is the second - second! - largest food processing sector in Alberta, representing 13% of the food and beverage manufacturing shipping. With the value added from all other dairy processing and manufacturing, Alberta's dairy industry contributed a record \$1.27 billion to the provincial economy in 2005, and is said to support nearly \$2.5 billion of economic activity within the provincial economy.

This performance makes dairy the second largest segment of the province's food processing activity, after meat produce manufacturing. Alberta's dairy industry has been, and will continue to be, a valuable partner to assisting the agriculture sector reach its farm cash receipt targets.

Source: Alberta Milk. Background: The Value of the Dairy Industry. <http://www.albertamilk.com> Accessed June 14, 2010.

What does this Mean for Local Farms?

In Canada, the average herd consists of about 68 cows producing 415,300 litres of milk per year. Cows produce, on average, 9,481kg of milk at 3.75% butterfat and 3.21% protein. Farms, on average, employ three people and provide employment indirectly for 1.4 more people. If you count processing, the average dairy farm provides employment for about eight people!

Source for Statistics: Canadian Dairy Information Centre

Don't Forget the Farmers' Share!

In 2005, milk sold for about \$1.78 per litre. Dairy farmers only received \$0.68, or 38% of the money from every litre of milk sold. In 1981, farmers received 56% of the retail price.

Up To Date Statistics

For the most recent statistics on the dairy industry in Canada or your province, contact the Canadian Dairy Information Centre (CIDC) at www.dairyinfo.gc.ca.

Source for The Farmers' Share: The Farmers' Share: Compare the Share Update 2006 – Diane J.F. Martz, Centre for Rural Studies and Enrichment – St. Peter's College, Muenster, Saskatchewan. November 2006

CAREERS IN AGRICULTURE

Dairy farming is a viable and rewarding career. Unlike many other jobs that people work at from 9:00 a.m. to 5:00 p.m., dairy farming also involves a lifestyle choice. As the business of farming expands and there are more things a farmer can know to help make their operation successful, it is often beneficial for farmers to attend college or university. Post-secondary education is an experience that teaches new skills, provides valuable contacts and networking opportunities, and enables future farmers to see the industry in a scope beyond that of their farm at home.

There are other careers related to the dairy industry that require post-secondary education of some nature. Think about the people who come to visit your farm or that you contact for reasons related to your farm – all of them have a job that is related to the dairy farm in some way because dairy farmers are their customers:

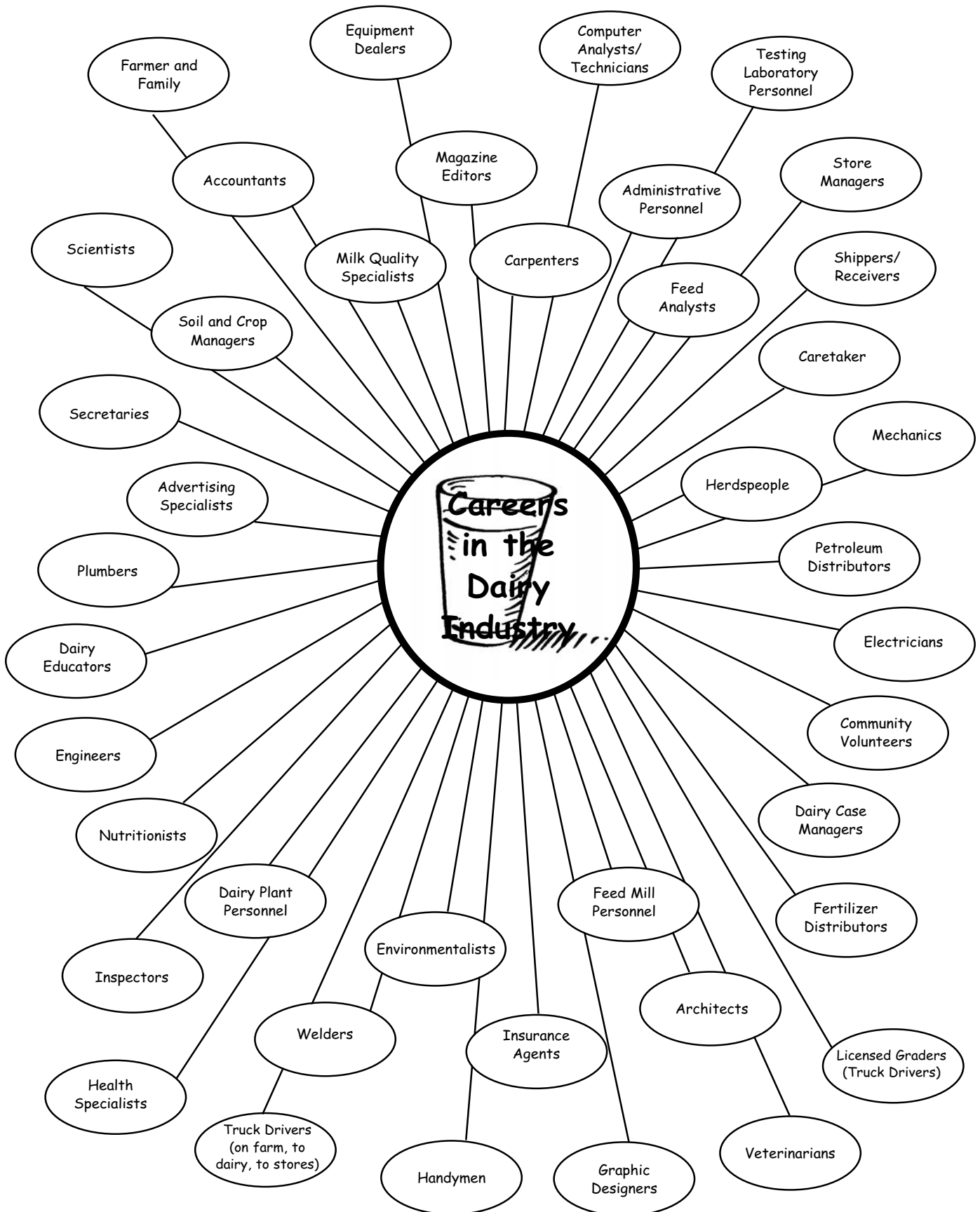
There are other jobs that are directly related to dairy farming as well, such as:

- Agricultural Banking Business Manager
- Artificial Insemination Technician
- Breed Association Staff (i.e. fieldperson, registry staff)
- Udder Health Specialist
- Semen Salesperson
- Nutritionist
- Crop Advisor
- Sire Analyst
- Milk Recording Staff (i.e. in the field, laboratory and office)
- Veterinarian
- Farm Managers
- Financial Consultants
- Custom Heifer Raiser
- Relief Farm Staff
- Company Sales Representatives
- Milk Truck Drivers
- And more . . .
- Agriculture Policy Analyst
- Dairy Journalist
- Dairy Researcher
- Agriculture Science Teacher

Even more jobs?

There really are an endless number of jobs that can be related to the dairy industry. Here are some examples that will help you 'think outside of the box' for jobs related to dairy farming.

- A dairy farmer builds a barn: related jobs could include an electrician, building contractor, equipment supply companies, plumber, roofer, mason, etc.
- Sutures are made from animal byproducts: related jobs are doctors, nurses, manufacturing companies, etc.
- Brake fluid is made from animal byproduct: manufacturing company, auto workers, mechanics, etc.



These are just some of the many possibilities. . . can you think of any more?

RECORD KEEPING ON THE DAIRY FARM

Record keeping is an important part of every farmer's daily activities. It helps farmers manage their herds because there are too many things to remember "off the top of your head". Records are also points of reference that farmers can look at and compare to help make informed decisions and set goals.

Records are tools that farmers can use to make management decisions about changes they need to make in their operation or what cows they need to cull from the herd.

Farmers need to keep track of many types of information:

Health Records – Farmers must record when cows are sick, the cause of the illness and how they were treated. It is also important to keep track of any medicines and vaccinations given to them. Keeping accurate health records is also a key component of the Canadian Quality Milk Program.

Why do you need to remember? As an example, if a cow has a vaccination, the record will indicate when she needs to receive a booster shot.

Breeding Records – There are many records related to breeding that must be maintained, including:

1. Calving date.
2. Heat dates.
3. Breeding dates.
4. How many times a cow is bred before she is pregnant.
5. Sire information.

If it takes too many breedings for a cow to become bred, or if a heat is not seen on her, it could indicate that she has a health problem that need to be addressed. It could also mean that she is a "problem breeder" that may need to be culled. When it takes longer to get a cow back in calf, she has to produce milk for a longer period of time. This means that she does not calve on a one year interval and will produce less milk over the course of her lifetime.

Calving Records – Whenever a calf is born on the farm it is very important to write the event down. The calf needs to be identified with an ear tag, and her name and number must be recorded. Some breeds, and any animals that will cross the border into the United States, may need to be tattooed (or branded) to indicate they are from Canada. If the animal is registered, even more information must be recorded including parentage.

Milk Records – Knowing the amount of milk, fat and protein each cow produces helps a farmer manage his or her herd. Knowing somatic cell counts and other health traits is beneficial as well. Milk recording companies help farmers maintain milk records. Technicians (milk testers) come to your farm to measure and test the milk each cow gives. This allows the cows in the herd to be compared to one another and to other cows of the same age and breed. A cow who gives a lot less milk than the others in the herd may need to be culled.

Classification Records – Conformation analysis can be done on each cow by an accredited classifier through Holstein Canada. Holstein Canada coordinates the classification system for all dairy breeds.

Financial Records – Farms must keep track of their financial records by budgeting, recording income and expenses and keeping track of assets and liabilities.

Record Keeping Systems

There are different systems of keeping records on a farm based on the amount of time they need to be kept. Records usually move from one system to another.

Temporary – These are records that can be quickly and easily written down but are usually rewritten later in another, more permanent record keeping system. In the barn you could carry a notepad and pen to write down heats or medications/treatments given. A board in the milk house can also show temporary records for anyone doing the chores to see, such as which cows have mastitis or who is in heat.

Semi-permanent – When you have more time you can transfer temporary records to a semi-permanent form of record keeping. For example, heats recorded on a piece of paper can later be marked on a breeding wheel.

Permanent – Semi-permanent records should be moved to a file for each animal. Permanent records hold the cow's life history. These records do not have to be physical files! That would take up a lot of paper. Computer programs designed for dairy herds are good locations to keep permanent records. In case your computer crashes, **do not forget to make backup copies of your files.**

Herd records must be kept for **15 years**. That seems like a long time and a lot of data but they prove that your cows are as good as you say they are. They improve the value of your herd and of the breed as a whole.

Herd Production Records – Valuable Management Tools

Keeping your records in a shoebox does not help manage your herd effectively. Treatments of lactating cows must be recorded daily to make sure that contaminated milk is not put into the bulk tank. Milk production numbers and somatic cell counts (SCC) can be examined over the course of a year to help farmers spot problem months when SCCs rise. This helps farmers know to look for problems and fix them.

There are two companies offering milk recording services in Canada:

1. Canwest DHI (Dairy Herd Improvement) in British Columbia, Alberta, Saskatchewan, Manitoba and Ontario.
2. Valacta in Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland

Most examples in this manual use Canwest DHI data. For additional information, or for specific examples from one of the other milk recording agencies, please contact the applicable organization:

<p>CanWest DHI Telephone: 1-800-549-4373 or 519-824-2320 Email: info@canwestdhi.com Website: www.canwestdhi.com</p>	<p>Valacta Telephone: 514-398-7880 Email: info@patlq.com Website: www.valacta.com</p>
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CanWest DHI Provides benchmarks that can help farmers know where they can improve their herds:

2009 Management Centre Benchmarks - Alberta, Based on 2009 Herd Averages

Percentile *	25th	50th	75th	90 th
Number of Cows	79	108	152	213
Standard Milk (kgs)	31.2	33.6	35.7	37.3
Annual Milk Value (\$)	5,319	5,946	6,438	6,738
Udder Health (Linear Score)	2.8	2.6	2.3	2.1
Age at 1st Calving (y-dd)	2-126	2-072	2-038	2-014
Calving Intervals (months)	14.5	13.8	13.3	12.9
% of herd in 3+ lactation	32.7	36.9	42.1	46.6
Efficiency (% of herd in milk)	78.6	82.9	85.7	87.9
Turnover (% of herd removed)	45.4	38.6	32.4	25.2
Days Dry	93	79	68	61
Days to 1st Breeding	98	84	75	69

* How Percentiles Work: If all the herds were arranged in order from lowest to highest, the 75th percentile would be the value of the herd that is better than 75% of all the other herds. The 99th percentile value is that which is better than 99% of all the other herds.

Source: Canwest DHI's 2009 Western Herd Improvement Report. <http://www.canwestdhi.com/publications.htm>

By comparing your herd records to these benchmarks, you can identify the areas that you need to improve your farm. For example, if your herd was in the 40th percentile for calving interval, that means that 60% of herds have a shorter calving interval than yours does. This is obviously an area that you could improve upon by ensuring balanced rations are fed, checking for heats more often and maintaining more accurate breeding records.

Farmers can analyze their own farms to determine if they are improving year to year. CanWest DHI analyzes your farm's activities as well as thousands of others, making their management benchmarks good points for comparison to improve management and profitability. In addition to increasing production and profitability related to milk, animals on milk recording systems have a higher resale value than those who are not milk recorded. Herds that just want to know information for their own management purposes can maintain unofficial management records that do not have to be supervised by DHI staff, and do not have to be done regularly. In order for records to be promoted and publishable, producers must have at least 8 tests per year, of which at least half must be supervised by DHI staff.

When the milk is sampled on the farm on test days, it goes through a meter system that measures the amount of milk each cow gives. The milk tester takes samples of each cow's milk, mixes them with a preservative, and

sends them for laboratory testing. The milk tester may also assist with electronic animal registrations and feed and soil analysis.

From these tests, several reports are created to provide detailed information on herd production levels:

Herd Summary and Monitor Reports include six sections within them:

1. **Stage of Lactation** – Shows daily milk and 305 day projections broken down by stage of lactation. Daily fat and protein yield are usually included in herd summaries, but herd monitor reports can include other options as well.
2. **Lactation Group Profile** – Breeds Class Average (BCAs) for milk, fat and protein, volume projections, and estimated milk values are broken down by lactation group (number of lactations).

At the lab, the following tests are performed with reports given on an individual cow and herd basis:

- Measure of the percentage of butterfat in milk.
- Measure of the percentage of protein in milk.
- Somatic Cell Count (SCC) (*Optional*)
- Milk Urea Nitrogen Test (MUN) (*Optional*)
- Leukosis Test (*Optional*) – Tests milk for evidence of individual animals carrying leukosis.
- Johne's Test (*Optional*) – Tests milk for evidence of individual animals being infected with Johne's Disease.

3. **Standard Milk Graph** – Standard milk is adjusted to a cow's 2nd lactation at 150 days in milk, with component tests of 4.0% fat and 3.3% protein. This standardizes the herd to chart progress without bias of changing days in milk, number of first lactation animals, etc.
4. **Lactation Ratings** – Provided for milk, fat and protein, and indicates accuracy of records.
5. **Production Averages** – Shows the current, rolling, and annual herd Breeds Class Average (BCAs). The current data is based on test day information; the rolling herd average is a rolling 12-month history of the herd production, and is broken down by breed. Annual averages are historical records of the past twelve months of production.
6. **Test Day Summary** – Actual test day production numbers and projected BCAs based on production-to-date in the current lactation.

Herd monitor reports also enable you to compare your herd to the DHI benchmarks and enter farm goals. Management trends for production levels, somatic cell count, MUN test levels, herd age, age at first calving, milk value, days open, and linear score can also be calculated.

Hotsheet Report – Warns farmers of low milk, fat or protein production, abnormal protein:fat ratios or high somatic cell counts.

Cow Summary/Monitor Reports – These reports show information similar to that in the herd summaries, but information is given on an individual cow basis. The charts show test day milk, fat and protein production data, cow production to date, projected production and BCAs, days in milk, lactation number, age at calving, and other management information.

Cow Income Monitor Reports – Shows the economic impact of each individual cow's performance.

Milk Urea Nitrogen Test Reports (MUN) – MUN test reports indicate the amount of undigested protein found in the milk. Protein is broken down in the rumen and if it is out of balance with dietary energy, the MUN test will be elevated. This report can help you and your nutritionist with ration balancing.

Somatic Cell Counts – Somatic cells are white blood cells produced by the cow's immune system. SCCs are used to identify cows likely to have mastitis. Cows should be checked if they have SCCs above 200,000. Linear scores for SCC are good indicators of udder health for the entire herd.

Certificates of Production and Cow Profiles – When animals have completed their records, these reports are generated to show individual cow production levels, BCAs, lactation curves, and the animal's deviation from other animals in the herd.

An Important Part of Production Records – BCAs

BCAs (Breed Class Averages) were first developed in the 1950s to compare the productivity of cows of different breeds and ages. A BCA is a comparison of a cow's production to other animals of her breed and age. BCAs are created for milk, fat and protein. They are compared to standards that indicate the average yield for a cow that is a particular breed, age, and calving month.

Individual animals are compared to herd averages to get their deviations from the herd average. This data can be very useful. For instance, if a herd has low production yields and an individual cow has average production for the breed, but has high positive deviations from herd average milk, fat, and protein, she is probably a good cow that would do well on another farm that is achieving higher production levels.

Classification Records

Classification is when an independent and objective classifier from Holstein Canada visits your farm to assess the conformation of individual animals. This is an optional form of record keeping for farmers but it is one that can have many benefits. The most profitable cows are ones that have functional type traits which facilitate adequate milk production and allow them to remain in the herd for a long time. Classifying helps farmers determine which cows are the best ones to keep in their herd, and which cows will best help them to meet their goals.



Butler True Type Model - Holstein

Conformation is one basis of high production. Cows that have desirable physical traits eat more roughage, transmit desirable characteristics to their offspring and improve their production levels as they get older.

Classification can be a useful management tool in several ways:

- Breeding and raising the type of animals you want to work with.
- Providing information to make profitable decisions.
- Providing information to help improve your herd through corrective breeding.

There are other benefits to this service as well. Artificial insemination units often provide financial incentives to help herds classify because it helps their bulls obtain proofs by providing more daughter information. Cows and heifers from classified families have higher Lifetime Profit Indexes (LPIs), and Estimated Breeding Values (EBVs) than unclassified ones. Semen companies also provide computer generated genetic matings for classified herds. In addition, animals that are classified have higher resale values than those that are not classified. Cows that are classified higher tend to produce more milk and be more profitable than cows with lower classifications.

Animals of each dairy breed are evaluated compared to their breed scorecards, which have been developed based on the True Type Model. The classifier looks at the breakdown of four major composite traits: mammary system, feet and legs, rump, and dairy strength. While the same 21 traits are assessed for each breed, different goals, strengths and weaknesses of the breeds have led their classification committees to create slightly different scorecards. Each trait is assessed based on a linear system, rated 1 to 9, based on measurements and visual assessments.

When classified, cows are placed into one of the following categories:

- Excellent (EX) - 90 points and higher

Animals can be reclassified for EX status in subsequent lactations, and will receive multiple "Excellent" status for scoring EX on different lactations. In Canada, a cow must have had 3 natural calvings to be scored this high. Jerseys that score EX when they are 10 years of age or older are awarded the title of Supreme Excellent (SUP-EX) to showcase their longevity.

For example: A cow scored EX 92-3E has been scored 92/100 points and has been granted an Excellent score on three different lactations.

- Very Good (VG) – 85-89 points
- Good Plus (GP) – 80-84 points
- Good (G) – 70-79 points
- Fair (F) – below 70 points

DAIRY BREED SCORECARDS

Each dairy breed has its own scorecard. While each scorecard is similar, there are slight breed differences. The scorecards for the six major dairy breeds in Canada can be found on the following pages.

Ayrshire Conformation Analysis - Female

Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (45%)	high	1 2 3 4 5 6 7 8 9	low	10	Advanced Anus ₂	13	High Tailhead ₁
		Pin Width (35%)	narrow	1 2 3 4 5 6 7 8 9	wide	11	Advanced Tailhead _{1.5}	14	Wry Tail _{0.5}
		Loin Strength (20%)	weak	1 2 3 4 5 6 7 8 9	strong	12	Recessed Tailhead ₁		
		Thurl Placement (research)	back	1 2 3 4 5 6 7 8 9	ahead				

Mammary System (40%)		Udder Depth (13%)	deep	1 2 3 4 5 6 7 8 9	shallow	20	Tilt ₂	26	Blind Quarter ₈
		Udder Texture (15%)	fleshy	1 2 3 4 5 6 7 8 9	soft	21	Reverse Tilt _{0.5}	27	Webbed Teat _{1.5}
		Median Suspensory (15%)	weak	1 2 3 4 5 6 7 8 9	strong	22	Short Fore ₁	28	Front Teats Back _{0.5}
		Fore Attachment (15%)	weak	1 2 3 4 5 6 7 8 9	strong	23	Short Rear ₁	29	Rear Teats Back _{0.5}
		Front Teat Placement (7%)	wide	1 2 3 4 5 6 7 8 9	close	24	Lacks Udder Shape ₁		
		Rear Attachment Height (13%)	low	1 2 3 4 5 6 7 8 9	high	25	Unbalanced Quarter _{0.5}		
		Rear Attachment Width (13%)	narrow	1 2 3 4 5 6 7 8 9	wide				
		Rear Teat Placement (7%)	wide	1 2 3 4 5 6 7 8 9	close				
Teat Length (2%)	short	1 2 3 4 5 6 7 8 9	long						

Feet & Legs (25%)		Foot Angle (20%)	low	1 2 3 4 5 6 7 8 9	steep	30	Abnormal Claw _{1.5}	34	Crampy ₃
		Heel Depth (25%)	shallow	1 2 3 4 5 6 7 8 9	deep	31	Weak Pasterns _{1.5}	35	Thurls Back/Low _{1.5}
		Bone Quality (15%)	coarse	1 2 3 4 5 6 7 8 9	flat	32	Boggy Hocks ₁	36	Toes Out Front ₁
		Rear Legs-Side View (20%)	straight	1 2 3 4 5 6 7 8 9	curved	33	Lacks Bone _{0.5}		
		Rear Legs-Rear View (20%)	hocked-in	1 2 3 4 5 6 7 8 9	straight				
		Locomotion (research)	non-mobile	1 2 3 4 5 6 7 8 9	mobile				

Dairy Strength (25%)		Stature (10%)	short	1 2 3 4 5 6 7 8 9	tall	40	Wry Face ₁	44	Weak Back _{1.5}
		Height at Front End (3%)	low	1 2 3 4 5 6 7 8 9	high	41	Malformed Jaw _{0.5}	45	Not Well Sprung _{1.5}
		Chest Width (20%)	narrow	1 2 3 4 5 6 7 8 9	wide	42	Shallow Fore Rib ₂	46	Lacks Balance ₁
		Body Depth (20%)	shallow	1 2 3 4 5 6 7 8 9	deep	43	Weak Crops ₁		
		Angularity (25%)	non-angular	1 2 3 4 5 6 7 8 9	angular				
		Body Condition Score (research)	low	1 2 3 4 5 6 7 8 9	high				
		Bone Quality (6%) Udder Texture (6%) Loin Strength (10%)							

Class	Score	Comments:
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Brown Swiss

Conformation Analysis - Female

Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (40%)	high 1 2 3 4 5 6 7 8 9 low		10 Advanced Anus _{2.5}	13 High Tailhead _{0.5}
		Pin Width (35%)	narrow 1 2 3 4 5 6 7 8 9 wide		11 Advanced Tailhead _{1.5}	14 Wry Tail ₁
		Loin Strength (25%)	weak 1 2 3 4 5 6 7 8 9 strong		12 Recessed Tailhead ₁	
		Thurl Placement (research)	back 1 2 3 4 5 6 7 8 9 ahead			

Mammary System (40%)		Udder Depth (14%)	deep 1 2 3 4 5 6 7 8 9 shallow		20 Tilt ₁	26 Blind Quarter ₈
		Udder Texture (15%)	fleshy 1 2 3 4 5 6 7 8 9 soft		21 Reverse Tilt _{0.5}	27 Webbed Teat ₂
		Median Suspensory (17%)	weak 1 2 3 4 5 6 7 8 9 strong		22 Short Fore ₁	28 Front Teats Back ₁
		Fore Attachment (16%)	weak 1 2 3 4 5 6 7 8 9 strong		23 Short Rear ₁	29 Rear Teats Back ₁
		Front Teat Placement (8%)	wide 1 2 3 4 5 6 7 8 9 close		24 Lacks Udder Shape ₁	
		Rear Attachment Height (11%)	low 1 2 3 4 5 6 7 8 9 high		25 Unbalanced Quarter ₁	
		Rear Attachment Width (11%)	narrow 1 2 3 4 5 6 7 8 9 wide			
		Rear Teat Placement (6%)	wide 1 2 3 4 5 6 7 8 9 close			
	Teat Length (2%)	short 1 2 3 4 5 6 7 8 9 long				

Feet & Legs (25%)		Foot Angle (25%)	low 1 2 3 4 5 6 7 8 9 steep		30 Abnormal Claw _{1.5}	34 Crampy ₃
		Heel Depth (22%)	shallow 1 2 3 4 5 6 7 8 9 deep		31 Weak Pasterns _{1.5}	35 Thurls Back/Low _{1.5}
		Bone Quality (10%)	coarse 1 2 3 4 5 6 7 8 9 flat		32 Boggy Hocks ₁	36 Toes Out Front _{1.5}
		Rear Legs-Side View (17%)	straight 1 2 3 4 5 6 7 8 9 curved		33 Lacks Bone _{0.5}	
		Rear Legs-Rear View (26%)	hocked-in 1 2 3 4 5 6 7 8 9 straight			
		Locomotion (research)	non-mobile 1 2 3 4 5 6 7 8 9 mobile			

Dairy Strength (25%)		Stature (10%)	short 1 2 3 4 5 6 7 8 9 tall		40 Wry Face ₁	44 Weak Back _{1.5}
		Height at Front End (0%)	low 1 2 3 4 5 6 7 8 9 high		41 Malformed Jaw ₁	45 Not Well Sprung _{1.5}
		Chest Width (25%)	narrow 1 2 3 4 5 6 7 8 9 wide		42 Shallow Fore Rib _{1.5}	46 Lacks Balance ₁
		Body Depth (15%)	shallow 1 2 3 4 5 6 7 8 9 deep		43 Weak Crops _{1.5}	
		Angularity (25%)	non-angular 1 2 3 4 5 6 7 8 9 angular			
		Body Condition Score (research)	low 1 2 3 4 5 6 7 8 9 high			

Class	Score	Comments:
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Canadienne Conformation Analysis - Female

Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (42%)	high	1 2 3 4 5 6 7 8 9	low	10	Advanced Anus _{2.5}	13	High Tailhead _{0.5}
		Pin Width (26%)	narrow	1 2 3 4 5 6 7 8 9	wide	11	Advanced Tailhead _{1.5}	14	Wry Tail ₁
		Loin Strength (32%)	weak	1 2 3 4 5 6 7 8 9	strong	12	Recessed Tailhead ₁		
		Thurl Placement (research)	back	1 2 3 4 5 6 7 8 9	ahead				

Mammary System (40%)		Udder Depth (14%)	deep	1 2 3 4 5 6 7 8 9	shallow	20	Tilt ₁	26	Blind Quarter ₈
		Udder Texture (16%)	fleshy	1 2 3 4 5 6 7 8 9	soft	21	Reverse Tilt _{0.5}	27	Webbed Teat ₂
		Median Suspensory (14%)	weak	1 2 3 4 5 6 7 8 9	strong	22	Short Fore ₁	28	Front Teats Back ₁
		Fore Attachment (16%)	weak	1 2 3 4 5 6 7 8 9	strong	23	Short Rear ₁	29	Rear Teats Back ₁
		Front Teat Placement (8%)	wide	1 2 3 4 5 6 7 8 9	close	24	Lacks Udder Shape ₁		
		Rear Attachment Height (13%)	low	1 2 3 4 5 6 7 8 9	high	25	Unbalanced Quarter ₁		
		Rear Attachment Width (11%)	narrow	1 2 3 4 5 6 7 8 9	wide				
		Rear Teat Placement (6%)	wide	1 2 3 4 5 6 7 8 9	close				
Teat Length (2%)	short	1 2 3 4 5 6 7 8 9	long						

Feet & Legs (25%)		Foot Angle (25%)	low	1 2 3 4 5 6 7 8 9	steep	30	Abnormal Claw _{1.5}	34	Crampy ₃
		Heel Depth (22%)	shallow	1 2 3 4 5 6 7 8 9	deep	31	Weak Pasterns _{1.5}	35	Thurls Back/Low _{1.5}
		Bone Quality (10%)	coarse	1 2 3 4 5 6 7 8 9	flat	32	Boggy Hocks ₁	36	Toes Out Front _{1.5}
		Rear Legs-Side View (17%)	straight	1 2 3 4 5 6 7 8 9	curved	33	Lacks Bone _{0.5}		
		Rear Legs-Rear View (26%)	hocked-in	1 2 3 4 5 6 7 8 9	straight				
		Locomotion (research)	non-mobile	1 2 3 4 5 6 7 8 9	mobile				

Dairy Strength (25%)		Stature (11%)	short	1 2 3 4 5 6 7 8 9	tall	40	Wry Face ₁	44	Weak Back _{1.5}
		Height at Front End (5%)	low	1 2 3 4 5 6 7 8 9	high	41	Malformed Jaw ₁	45	Not Well Sprung _{1.5}
		Chest Width (20%)	narrow	1 2 3 4 5 6 7 8 9	wide	42	Shallow Fore Rib _{1.5}	46	Lacks Balance ₁
		Body Depth (18%)	shallow	1 2 3 4 5 6 7 8 9	deep	43	Weak Crops _{1.5}		
		Angularity (25%)	non-angular	1 2 3 4 5 6 7 8 9	angular				
		Body Condition Score (research)	low	1 2 3 4 5 6 7 8 9	high				
		Bone Quality (10%)							
		Udder Texture (5%)							
		Loin Strength (6%)							

Class	Score	Comments:
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Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Guernsey

Conformation Analysis - Female

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (42%)	high	1 2 3 4 5 6 7 8 9	low	10	Advanced Anus _{2.5}	13	High Tailhead _{0.5}
		Pin Width (26%)	narrow	1 2 3 4 5 6 7 8 9	wide	11	Advanced Tailhead _{1.5}	14	Wry Tail ₁
		Loin Strength (32%)	weak	1 2 3 4 5 6 7 8 9	strong	12	Recessed Tailhead ₁		
		Thurl Placement (research)	back	1 2 3 4 5 6 7 8 9	ahead				

Mammary System (40%)		Udder Depth (14%)	deep	1 2 3 4 5 6 7 8 9	shallow	20	Tilt ₁	26	Blind Quarter ₈
		Udder Texture (16%)	fleshy	1 2 3 4 5 6 7 8 9	soft	21	Reverse Tilt _{0.5}	27	Webbed Teat ₂
		Median Suspensory (14%)	weak	1 2 3 4 5 6 7 8 9	strong	22	Short Fore ₁	28	Front Teats Back ₁
		Fore Attachment (16%)	weak	1 2 3 4 5 6 7 8 9	strong	23	Short Rear ₁	29	Rear Teats Back ₁
		Front Teat Placement (8%)	wide	1 2 3 4 5 6 7 8 9	close	24	Lacks Udder Shape ₁		
		Rear Attachment Height (13%)	low	1 2 3 4 5 6 7 8 9	high	25	Unbalanced Quarter ₁		
		Rear Attachment Width (11%)	narrow	1 2 3 4 5 6 7 8 9	wide				
		Rear Teat Placement (6%)	wide	1 2 3 4 5 6 7 8 9	close				
		Teat Length (2%)	short	1 2 3 4 5 6 7 8 9	long				

Feet & Legs (25%)		Foot Angle (25%)	low	1 2 3 4 5 6 7 8 9	steep	30	Abnormal Claw _{1.5}	34	Crampy ₃
		Heel Depth (22%)	shallow	1 2 3 4 5 6 7 8 9	deep	31	Weak Pasterns _{1.5}	35	Thurls Back/Low _{1.5}
		Bone Quality (10%)	coarse	1 2 3 4 5 6 7 8 9	flat	32	Boggy Hocks ₁	36	Toes Out Front _{1.5}
		Rear Legs-Side View (17%)	straight	1 2 3 4 5 6 7 8 9	curved	33	Lacks Bone _{0.5}		
		Rear Legs-Rear View (26%)	hocked-in	1 2 3 4 5 6 7 8 9	straight				
		Locomotion (research)	non-mobile	1 2 3 4 5 6 7 8 9	mobile				

Dairy Strength (25%)		Stature (11%)	short	1 2 3 4 5 6 7 8 9	tall	40	Wry Face ₁	44	Weak Back _{1.5}
		Height at Front End (5%)	low	1 2 3 4 5 6 7 8 9	high	41	Malformed Jaw ₁	45	Not Well Sprung _{1.5}
		Chest Width (20%)	narrow	1 2 3 4 5 6 7 8 9	wide	42	Shallow Fore Rib _{1.5}	46	Lacks Balance ₁
		Body Depth (18%)	shallow	1 2 3 4 5 6 7 8 9	deep	43	Weak Crops _{1.5}		
		Angularity (25%)	non-angular	1 2 3 4 5 6 7 8 9	angular				
		Body Condition Score (research)	low	1 2 3 4 5 6 7 8 9	high				
		Bone Quality (10%) Udder Texture (5%) Loin Strength (6%)							

Class	Score	Comments:
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Holstein Canada Conformation Analysis - Female

Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (42%)	high	1 2 3 4 5 6 7 8 9	low	10 Advanced Anus _{2.5}	13 High Tailhead _{0.5}
		Pin Width (26%)	narrow	1 2 3 4 5 6 7 8 9	wide	11 Advanced Tailhead _{1.5}	14 Wry Tail ₁
		Loin Strength (32%)	weak	1 2 3 4 5 6 7 8 9	strong	12 Recessed Tailhead ₁	
		Thurl Placement (research)	back	1 2 3 4 5 6 7 8 9	ahead		

Mammary System (42%)		Udder Depth (14%)	deep	1 2 3 4 5 6 7 8 9	shallow	20 Tilt ₁	26 Blind Quarter ₈
		Udder Texture (16%)	fleshy	1 2 3 4 5 6 7 8 9	soft	21 Reverse Tilt _{0.5}	27 Webbed Teat ₂
		Median Suspensory (14%)	weak	1 2 3 4 5 6 7 8 9	strong	22 Short Fore ₁	28 Front Teats Back ₁
		Fore Attachment (16%)	weak	1 2 3 4 5 6 7 8 9	strong	23 Short Rear ₁	29 Rear Teats Back ₁
		Front Teat Placement (8%)	wide	1 2 3 4 5 6 7 8 9	close	24 Lacks Udder Shape ₁	
		Rear Attachment Height (12%)	low	1 2 3 4 5 6 7 8 9	high	25 Unbalanced Quarter ₁	
		Rear Attachment Width (10%)	narrow	1 2 3 4 5 6 7 8 9	wide		
		Rear Teat Placement (8%)	wide	1 2 3 4 5 6 7 8 9	close		
Teat Length (2%)	short	1 2 3 4 5 6 7 8 9	long				

Feet & Legs (26%)		Foot Angle (20%)	low	1 2 3 4 5 6 7 8 9	steep	30 Abnormal Claw _{1.5}	34 Crampy ₃
		Heel Depth (20%)	shallow	1 2 3 4 5 6 7 8 9	deep	31 Weak Pasterns _{1.5}	35 Thurls Back/Low _{1.5}
		Bone Quality (12%)	coarse	1 2 3 4 5 6 7 8 9	flat	32 Boggy Hocks ₁	36 Toes Out Front _{1.5}
		Rear Legs-Side View (17%)	straight	1 2 3 4 5 6 7 8 9	curved	33 Lacks Bone _{0.5}	
		Rear Legs-Rear View (31%)	hocked-in	1 2 3 4 5 6 7 8 9	straight		
		Locomotion (research)	non-mobile	1 2 3 4 5 6 7 8 9	mobile		

Dairy Strength (22%)		Stature (12%)	short	1 2 3 4 5 6 7 8 9	tall	40 Wry Face ₁	44 Weak Back _{1.5}
		Height at Front End (3%)	low	1 2 3 4 5 6 7 8 9	high	41 Malformed Jaw ₁	45 Not Well Sprung _{1.5}
		Chest Width (23%)	narrow	1 2 3 4 5 6 7 8 9	wide	42 Shallow Fore Rib _{1.5}	46 Lacks Balance ₁
		Body Depth (17%)	shallow	1 2 3 4 5 6 7 8 9	deep	43 Weak Crops _{1.5}	
		Angularity (28%)	non-angular	1 2 3 4 5 6 7 8 9	angular		
		Body Condition Score (5%) Udder Texture (5%) Loin Strength (7%)	low	1 2 3 4 5 6 7 8 9	high		

Class	Score	Comments:
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Jersey Canada Conformation Analysis - Female

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (8%)		Rump Angle (42%)	high <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> low		<input type="text" value="10"/> Advanced Anus _{1.5} <input type="text" value="13"/> High Tailhead _{0.5}
		Pin Width (26%)	narrow <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> wide		<input type="text" value="11"/> Advanced Tailhead _{1.5} <input type="text" value="14"/> Wry Tail ₁
		Loin Strength (32%)	weak <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> strong		<input type="text" value="12"/> Recessed Tailhead ₁
		Thurl Placement (research)	back <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> ahead		

Mammary System (48%)		Udder Depth (14%)	deep <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> shallow		<input type="text" value="20"/> Tilt ₁ <input type="text" value="26"/> Blind Quarter ₈
		Udder Texture (12%)	fleshy <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> soft		<input type="text" value="21"/> Reverse Tilt _{0.5} <input type="text" value="27"/> Webbed Teat ₂
		Median Suspensory (16%)	weak <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> strong		<input type="text" value="22"/> Short Fore ₁ <input type="text" value="28"/> Front Teats Back ₁
		Fore Attachment (15%)	weak <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> strong		<input type="text" value="23"/> Short Rear ₁ <input type="text" value="29"/> Rear Teats Back ₁
		Front Teat Placement (8%)	wide <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> close		<input type="text" value="24"/> Lacks Udder Shape ₁
		Rear Attachment Height (16%)	low <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> high		<input type="text" value="25"/> Unbalanced Quarter ₁
		Rear Attachment Width (12%)	narrow <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> wide		
		Rear Teat Placement (5%)	wide <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> close		
	Teat Length (2%)	short <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> long			

Feet & Legs (15%)		Foot Angle (22%)	low <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> steep		<input type="text" value="30"/> Abnormal Claw ₁ <input type="text" value="34"/> Crampy ₃
		Heel Depth (25%)	shallow <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> deep		<input type="text" value="31"/> Weak Pasterns ₁ <input type="text" value="35"/> Thurls Back/Low _{1.5}
		Bone Quality (9%)	coarse <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> flat		<input type="text" value="32"/> Boggy Hocks ₁ <input type="text" value="36"/> Toes Out Front _{1.5}
		Rear Legs-Side View (15%)	straight <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> curved		<input type="text" value="33"/> Lacks Bone ₀
		Rear Legs-Rear View (29%)	hocked-in <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> straight		
		Locomotion (research)	non-mobile <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> mobile		

Dairy Strength (29%)		Stature (5%)	short <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> tall		<input type="text" value="40"/> Wry Face ₁ <input type="text" value="44"/> Weak Back ₁
		Height at Front End (5%)	low <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> high		<input type="text" value="41"/> Malformed Jaw ₁ <input type="text" value="45"/> Not Well Sprung _{1.5}
		Chest Width (20%)	narrow <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> wide		<input type="text" value="42"/> Shallow Fore Rib _{1.5} <input type="text" value="46"/> Lacks Balance ₁
		Body Depth (25%)	shallow <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> deep		<input type="text" value="43"/> Weak Crops _{1.5}
		Angularity (25%)	non-angular <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> angular		
		Body Condition Score (research)	low <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> high		
	Bone Quality (5%)				
	Udder Texture (5%)				
	Loin Strength (10%)				

Class	Score	Comments:
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Milking Shorthorn Conformation Analysis - Female

Box 610
Brantford, ON
Canada N3T 5R4

Phone: 519-756-8300
Fax: 519-756-5878

Name or Barn No.	Client	Classification Date		
Registration No.	Sire Registration No.	Birth Date	Calving Date	Lactation No.

Section	Score	Descriptive Traits	Defective Characteristics
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Rump (10%)		Rump Angle (40%)	high 1 2 3 4 5 6 7 8 9 low		10 Advanced Anus _{2.5}	13 High Tailhead _{0.5}
		Pin Width (30%)	narrow 1 2 3 4 5 6 7 8 9 wide		11 Advanced Tailhead _{1.5}	14 Wry Tail ₁
		Loin Strength (30%)	weak 1 2 3 4 5 6 7 8 9 strong		12 Recessed Tailhead ₁	
		Thurl Placement (research)	back 1 2 3 4 5 6 7 8 9 ahead			

Mammary System (40%)		Udder Depth (14%)	deep 1 2 3 4 5 6 7 8 9 shallow		20 Tilt ₁	26 Blind Quarter ₈
		Udder Texture (16%)	fleshy 1 2 3 4 5 6 7 8 9 soft		21 Reverse Tilt _{0.5}	27 Webbed Teat ₂
		Median Suspensory (16%)	weak 1 2 3 4 5 6 7 8 9 strong		22 Short Fore ₁	28 Front Teats Back ₁
		Fore Attachment (16%)	weak 1 2 3 4 5 6 7 8 9 strong		23 Short Rear ₁	29 Rear Teats Back ₁
		Front Teat Placement (8%)	wide 1 2 3 4 5 6 7 8 9 close		24 Lacks Udder Shape ₁	
		Rear Attachment Height (11%)	low 1 2 3 4 5 6 7 8 9 high		25 Unbalanced Quarter ₁	
		Rear Attachment Width (11%)	narrow 1 2 3 4 5 6 7 8 9 wide			
		Rear Teat Placement (6%)	wide 1 2 3 4 5 6 7 8 9 close			
		Teat Length (2%)	short 1 2 3 4 5 6 7 8 9 long			

Feet & Legs (25%)		Foot Angle (25%)	low 1 2 3 4 5 6 7 8 9 steep		30 Abnormal Claw _{1.5}	34 Crampy ₃
		Heel Depth (22%)	shallow 1 2 3 4 5 6 7 8 9 deep		31 Weak Pasterns _{1.5}	35 Thurls Back/Low _{1.5}
		Bone Quality (10%)	coarse 1 2 3 4 5 6 7 8 9 flat		32 Boggy Hocks ₁	36 Toes Out Front _{1.5}
		Rear Legs-Side View (17%)	straight 1 2 3 4 5 6 7 8 9 curved		33 Lacks Bone _{0.5}	
		Rear Legs-Rear View (26%)	hocked-in 1 2 3 4 5 6 7 8 9 straight			
		Locomotion (research)	non-mobile 1 2 3 4 5 6 7 8 9 mobile			

Dairy Strength (25%)		Stature (11%)	short 1 2 3 4 5 6 7 8 9 tall		40 Wry Face ₁	44 Weak Back _{1.5}
		Height at Front End (5%)	low 1 2 3 4 5 6 7 8 9 high		41 Malformed Jaw ₁	45 Not Well Sprung _{1.5}
		Chest Width (20%)	narrow 1 2 3 4 5 6 7 8 9 wide		42 Shallow Fore Rib _{1.5}	46 Lacks Balance ₁
		Body Depth (18%)	shallow 1 2 3 4 5 6 7 8 9 deep		43 Weak Crops _{1.5}	
		Angularity (25%)	non-angular 1 2 3 4 5 6 7 8 9 angular			
		Body Condition Score (research)	low 1 2 3 4 5 6 7 8 9 high			
		Bone Quality (10%) Udder Texture (5%) Loin Strength (6%)				

Class	Score	Comments:
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MANAGING THE MONEY AND PEOPLE ON YOUR FARM

Operating a farm is like operating any other business. It involves managing money, staff, keeping track of daily operations, and looking ahead to the future.

Financial Management

Budget Your Money

A budget is a plan. Farmers create budgets to plan how much they will have to spend on feed costs, veterinary bills, housing, equipment, etc. Comparing expenditures to budgeted amounts allows farmers to keep track of their spending throughout the year.

Digging Deeper - Financial Statements

Financial statements include a balance sheet and an income statement, among other things. A balance sheet shows the two “O”s – what is owed and what is owned – at a particular point in time. Money and other items owned are listed as “assets”, while debts are listed as “liabilities”.

Balance sheets are useful for several reasons:

- Determining your net worth.
- Figuring out if you need a loan or what assets you have to sell to repay a loan.
- Analyzing trends.
- Providing proof that you are able to repay a loan.

As shown below, there are several important components of a balance sheet, as indicated on this sample balance sheet for farms of different sizes:

FARM BALANCE SHEET			
(Assets at Estimated Value)			
FARM ASSETS	Low (50 Farms)	Avg (149 Farms)	High (50 Farms)
CURRENT ASSETS			
Cash (On Hand And In Bank)	11,844	1,516	-13,413
Accounts Receivable	22,489	29,161	43,943
Market & Feeder Livestock	3,628	3,654	1,549
Home-Grown Crops	46,195	61,007	92,187
Purchased Feed & Supplies	3,022	4,344	6,348
Other Current Assets	0	0	0
TOTAL CURRENT ASSETS	\$87,178	\$99,682	\$130,614
LONG TERM ASSETS			
Breeding Livestock	109,667	118,658	152,463
Market Quota	1,222,697	1,605,752	2,277,459
Field Machinery	282,364	260,705	286,048
Barn Equipment	65,726	84,710	129,160
Farm Buildings	187,045	224,419	274,817
Land	385,749	497,755	802,309
Other Long Term Assets	12,876	32,537	49,044
Total Long Term Assets	\$2,266,124	\$2,824,536	\$3,971,300
TOTAL FARM ASSETS	\$2,353,302	\$2,924,218	\$4,101,914
FARM LIABILITIES			
Accounts Payable	19,705	18,526	26,653
Interest Arrears	364	156	100
Operating Credit	22,236	24,611	26,131
Current Portion Of Term Debt	35,200	41,771	39,247
Total Current Liabilities	\$77,505	\$85,064	\$92,131
Term Debt	370,203	504,285	679,608
TOTAL FARM LIABILITIES	\$447,708	\$589,349	\$771,739
EQUITY IN FARM BUSINESS	\$1,905,594	\$2,334,869	\$3,330,175

Source: Ontario Farm Management Analysis Project – Ontario Dairy Summary 2005

The Farm Income Statement: Income vs Expenses

Part of the reason for operating any business is to make money. Money made that is not used to offset an expense is referred to as **net income**. **Gross income** is the total amount of revenue earned by the farm.

$$\text{Gross Income} - \text{Expenses} = \text{Net Income}$$

Farm Income Statements can be used to develop monthly budgets. They focus on everything that earns money (revenue) and what money is spent on (expenses). Expenses do not include purchases that will last longer than one year such as tractors, buildings, land, tile drainage, etc. Those items are assets that you will have in the future.

The net income is what the farmer uses to pay him or herself. In order to have money to live your daily life, save for the future, or have some extra money left over, your gross income must exceed expenses. It is recommended on farms that your expenses should not exceed 75% of your gross income. Thus, for every \$1.00 the farm earns, you should have \$0.25 left over after expenses. When expenses are lower, farmers have more money available to them. When expenses exceed the gross revenue, the farm is not making enough money to pay the bills.

In order to supplement income many farm families have a person with another job outside of the farm.

Debt and Loans

When money is borrowed from a bank, a person, or another lending institution, the arrangement for money borrowed is called a **loan**, which is a type of debt. Loans can be short or long term. Most farms have both types of loans. A mortgage on a farm is spread over many years and is referred to as a **long term loan**. In contrast, a loan that a farmer gets to help pay to plant his or her crop is a **short term loan** because it will be repaid in a few months when the crop is sold.

On a dairy farm, experts recommend that total debt should not be more than \$1.00 per litre of milk shipped. Farmers shipping 500,000 litres of milk per year should not have a debt exceeding \$500,000.

When seeking a loan, you must have all of your financial paperwork in order. You will need current and past financial statements, a business plan, proof of loan security and a good credit history. Remember that discussions with your banker are subject to negotiation. Pricing interest rates and terms with other banks and credit unions may help as well. Their first offer isn't necessarily their best offer!

Savings

The most financially successful people save at least 10% of their income. For every dollar earned, \$0.10 would go in the bank. The rest would then be used to pay bills and other expenses.

Year End Procedures

After the farm's fiscal year has ended, you should evaluate if you met your goals. This will help you plan for the next year. Most farmers have their finances reviewed by an accountant at the end of the year.

Insurance

All farms should pay into insurance. What if a drought damaged all of your crops? What if you lost your barn in a fire?

Without insurance it would cost so much to rebuild a facility or recover from a loss that it would be hard for most people to continue farming. Purchasing insurance provides peace of mind and should ensure that if something happens to your farm or animals you will receive compensation to fix it. You need to figure out how much and what types of insurance you need. This is one area where it is important to ask experts, such as insurance brokers, for advice.

Liability insurance for farm employees is another type of insurance that can prove very useful, if a farm worker is injured on the job.

Management Decisions on the Farm

Your financial statements can be used like tools to help you make management decisions on your farm. There are two ways to make money in the dairy industry:

1. Increase revenues
2. Cut expenses

Often, increasing revenues is done by expanding your barn (or building a new one) and purchasing more cows and quota. There are many factors to consider in determining if this will be a profitable decision.

If you were thinking of expanding your milking herd from 80 cows to 180 cows there are some things you would need to find out. Some of the questions you should research are:

- How much quota will you need to buy, and at what price?
- What is your projected income?
- How much will more cows and building material cost?
- Do you need to build a new facility or can you adapt an existing barn?
- Do you require more feed storage facilities?
- Do you require more machinery and equipment?
- Do you have enough land to support more cows?
- Do you have enough time to manage the increased workload, and if not, are good employees available?
- What will the cash flow be after paying taxes?
- How risky is your investment? Are you willing to accept the risk of the project failing and losing a lot of money?

When in Doubt...Ask the Experts!

Managing a farm is a very diverse job. Farmers try to be dairy farmers, mechanics, financial planners, employers and managers, but it is impossible to be an expert at everything!

Farmers can get help from friends, family and professional advisors who can provide assistance with some of the services required. Hiring a good advisor (i.e. an accountant) will more than pay for itself with future savings and increased revenues. When considering expansion, building contractors and other professionals can be of assistance as well.

DIGGING DEEPER - YOU BE THE BOSS: HIRING FARM EMPLOYEES

When farms grow, farmers often do not have enough time to do all of the chores themselves, so they must hire employees. Before hiring staff, make sure that you have examined your budget and can afford to hire some help. Sometimes hiring someone can help your farm make even more money by making it run more efficiently. For example, if an employee is hired to fix machinery, more jobs can be accomplished because the machinery is in good working order. It might even cost more to fix broken machinery that is not maintained than it costs to hire an employee.

Finding the right person is important. This often takes some time and requires knowledge of the characteristics you are looking for in an employee. This includes finding someone who will work well with your personality type and management style.

Advertising in local or farm publications, or on websites, are all good way to find someone. There are six important items that a job ad should include:

1. Job title (i.e. relief milker, herdsman).
2. Positive things about your farm (i.e. expanding family business, modern dairy facility, century farm) that will attract a potential employee to it.
3. Job description (i.e. record keeping, milking cows, cleaning milking parlour, hours of work required).
4. Positive things about working on your farm (i.e. working independently or as a team, flexible hours, modern equipment, etc.).
5. Information on wages and benefits (i.e. housing, insurance, use of farm vehicle).
6. How to apply (i.e. mail, email, telephone, in person).

Prior to interviewing employees, create a list of questions that you would like to ask them. Similarly, interviewees may have prepared questions to ask you as well.

Keeping Employees

Once the expense has been made to hire and train an employee, a good farm manager will try to keep employees happy and satisfied with their jobs. There are many things that farm managers can do to retain employees. Sometimes what employees really want is not what their bosses think will satisfy them. The chart on the following pages shows these differences.

FEELINGS	EMPLOYEES' RANK (1=HIGHEST)	BOSSES RANK (1=HIGHEST)
Full appreciation of work being done	1	8
Feeling of being involved in what is going on	2	10
Understand and help with personal problems	3	9
Job security	4	2
Good wages	5	1
Interesting work	6	5
Opportunity to move up in the organization	7	3
Personal loyalty to employees	8	6
Good working conditions	9	4
Tactful disciplining	10	7

Source: North Central Region Extension Publication. 4-H Skills for Life Animal Science Series. Dairy 3 – Leading the Way, 17.

DIGGING DEEPER: HANDING OVER THE REIGNS ... FARM SUCCESSION PLANNING

You or one of your farming friends may be considering taking over the family farm someday. In order to ensure a smooth transition from one generation to the next, it is important to create a *Farm Succession Plan*. This reduces the possibility of fights among siblings or extended family when it comes to the day to day operation, management, and distribution of farm assets.

Since every farm business is unique, there is no standard way to design a succession plan; however, there are some basic steps to follow for any plan:

Preliminary Step – Communication – involves discussing ideas with family members, setting goals and objectives, deciding who the successor(s) will be, and making sure that the goals of the retiring and succeeding generations can fit together into a plan that will work. For example, if the retiring generation wants the farm to be carried on as a purebred dairy operation focusing on elite genetics, and the successor wishes to turn it into a commercial operation, they may not be able to come to an agreement.

Step 1 – Collect and Analyze Information – it is important to know all details of the farm business, both operationally and financially, before deciding if succession planning will be financially and logistically feasible.

Step 2 – Generate Options – brainstorm about different ways the plan could be put together to best suit the needs of everyone involved.

Step 3 – Make Preliminary Decisions about how the farm transfers will be made.

Step 4 – Develop a plan and review it. Common elements of a plan include:

1. Description of business.
2. Goals and expectations (both business and personal).
3. Retirement plans for the retiring generation
4. Successor Development Plan to give the new generation some initial direction.
5. Farm Business Plan because if the farm will continue it needs some future direction.
6. Operating Plan to define everyone's roles and responsibilities.
7. Outline the transfers of management, control and labour.
8. Description of the transfer of ownership.
9. Timeline of the entire transfer.
10. Communications strategy to ensure that everyone works together.
11. Contingency plan in case something does not work as originally thought.

Step 5 – Implement the plan and monitor its progress to ensure that the transition from one generation to the next goes smoothly. Some components of the plan may need to be reworked if there are problems when it is put into practice. Make sure that everyone agrees to any changes that are made.

Work Together

Change is often difficult since people get used to doing things the way they have always done them. It will take time for everyone to adjust to the farm transfer and will involve many difficult personal and financial decisions along the way. Remember that you do not have to do it all yourselves. There are many advisors who specialize in farm succession planning that could help to ensure that all details of the farm business are accounted for in the plan. Since it is often difficult mixing business with family, involving an objective third party advisor will be beneficial because they have no emotions attached to the business.

A farm succession plan has three main purposes:

1. Transfer of labour and tasks from one generation to the next.
2. Transfer decision making and control from one generation to the next.
3. Transfer ownership from one generation to the next (land titles, assets, etc.).

“PRECISION” DAIRY MANAGEMENT

Farmers are relying more and more on technology to help them manage their farms. Many mechanizations reduce instances of human error and may be simpler and more cost effective than hiring more labour to run the farm. While robotic milking systems may be the most obvious example of this type of management, there are several ways that farmers are using technology to better manage their farms:

- Electronic (radio frequency) identification systems and related management software.
- Robotic calf feeding systems and milk cow feeding systems.
- Automatic sorting systems.
- Pedometers or activity monitors to detect heats and lameness.
- Rumination monitors to assess stomach activity.
- Sensors to detect contractions during calving.
- Gait analyzers to detect lameness.
- Inner-ear temperature sensors.
- Sensors in pipelines to assess milk quality .
- Electronic scales to monitor weight changes.

Typically, paid and family labour accounts for 40% of the costs on a dairy farm. Mechanizing the operation with precision tools can reduce these costs tremendously; however, it is important for farmers to consider such options carefully and determine the mechanizations' viability in the dairy operation.

COMPUTERS ON THE DAIRY FARM

More and more dairy farmers are using computers to make their farming operations run more smoothly and efficiently. Computer programs help keep records about health, breeding, feed tests, milk production, finances... and many more things!

Why do farmers keep computer records? They are easier to use than handwritten reports. For example, a farmer could print off the last six months of feed costs to see if they were increasing. Using a specific computer printout can help farmers find areas to improve or make management decisions.

What other ways do farmers use computers? Here are some examples:

- Creating and maintaining a farm budget.
- Calculating pay cheques and deductions for farm employees.
- Assessing cow and bull mating options.
- Viewing sire records and cow evaluation information.
- Keeping records on calving dates, breedings, health programs, etc.
- Feeding cows.
- Surfing the web to find information about farming using internet search engines.
- Keeping track of information on breed association, provincial milk regulatory agency or milk recording websites.
- Selling cows through ads on websites.
- Seeking production information for their cows.
- Finding milk quality test results and pay rates for their farm.
- Writing letters.
- Calculating interest rates on quota and mortgages.
- Electronically registering animals.
- Ordering supplies online.
- Emailing to communicate with others.
- Finding and communicating with other farmers.
- Advertising.
- Operating farm machinery (i.e. Global Positioning Systems (GPS)).

Purchasing a Computer for Your Farm Business

When buying a computer for your farm, there are several things you will need to consider:

- Who will use it?
- What will it be used for?
- What programs will you need?
- How big should the hard-drive be?
- What type of monitor do you need? What size of monitor will be sufficient?

- How much memory (RAM) do you need?
- Do you want to purchase a package deal or to buy all of the components of the computer system separately?
- Does it need to be portable or can it remain in one location?

Talk to friends, other farmers and computer professionals to see what they like or do not like about their computer systems. This will help you find one that will be good for you.

Buying Software Packages

Many activities on the farm can be done without specialized software packages. A basic accounting program, word processing and spreadsheet programs can be very valuable.

There are a number of software programs available specifically for farmers. Programs are available for different levels of need and different herd sizes and can be classified into the following categories:

1. Simple event recording and record display program – A very basic program designed to record and display various types of farm records.
2. Full-featured management program – A program that is designed to display records and to analyze them as well.
3. Integrated Program – A program that keeps records and analyzes them just like a full-featured management program. An integrated program is linked to milk meters and feed systems so that data is automatically sent to the computer.

Checking Out the Internet

If you have an internet service provider giving your farm access to the internet, there are several websites that you may wish to check out:

www.omafra.gov.on.ca	OMAFRA factsheets, policies, statistics, and links to other agricultural resources
www.dairyinfo.gc.ca	Canadian Dairy Information Centre for statistics
www.milk.org	Dairy Farmers of Ontario
www.dairygoodness.ca	Dairy Farmers of Canada
www.ayrshire-canada.com	Ayrshire Canada
www.browncow.ca	Canadian Brown Swiss and Braunvieh Association
www.guernseycanada.ca	Canadian Guernsey Association
www.holstein.ca	Holstein Canada
www.jerseycanada.com	Jersey Canada
www.cmss.on.ca	Canadian Milking Shorthorn Society

www.albertamilk.com Alberta Milk

www.albertaholstein.ca Alberta Holstein Association

These are just a few of the websites you may find useful in your dairy business - the possibilities are endless! You can look up semen companies, government regulations, supply companies, and many other sites related to farming. The sites above all provide links to other websites within the dairy industry

You Could Be on the Web

More and more farms are creating their own websites. This is a good way to advertise your farm and connect with dairy farmers worldwide. When creating a website it is important to think about what you want to market about your herd. There are some common traits that many farm websites include:

- Logo – Design something that is unique to you.
- Motto – A slogan can help define your breeding or management philosophy.
- Highlight cow families that are prominent or of interest to others.
- Include pictures to make it more interesting.
- Farm history, current status, future goals.
- Show and sale results.
- Animals, embryos or semen for sale.
- Guestbook.

Regardless of what you put on your website, the most important thing to remember is to keep it current. Provide updates even if they are small ones. If people think that your website is not kept up to date they will stop visiting it.

Not Sure How to Design a Web Page?

There are several free web hosting sites that you can use to get your website up and running - and many of them come with a template feature which is pre-designed - you just have to fill in your information, and you have a website!

Web Hosting Sites to Explore:

- <http://www.mister.net>
- <http://members.freewebs.com/>
- <http://www.tripod.lycos.com/>

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References and Resources from the previous 4-H Ontario Dairy Manual:

- OMAFRA Factsheets: Business Targets for the Dairy Enterprise, Preparing a Financial Statement
- Money Matters
- Best Management Practices

RELATED ACTIVITIES (SEE LEADER’S GUIDE)

Milking Time Crossword	Milk Production & Marketing	All ages
Milk Nutrient Comparison	Milk Production & Marketing	All ages
Milk Product Taste Testing	Milk Production & Marketing	All ages
Milk Cheque Comparison	Milk Production & Marketing	All ages
Milking the Cows the Right Way	Milk Production & Marketing	All ages
Exploring the Udder	Milk Production & Marketing	All ages
Learning About Lactation Curves	Milk Production & Marketing	Senior & Junior members
Milk Production and Quota	Milk Production & Marketing	Senior members
DFO and Milk Marketing	Milk Production & Marketing	Senior members
Milk Quality	Milk Production & Marketing	Senior members
Farm Inspection	Milk Production & Marketing	All members
Tour of a Local Dairy	Milk Production & Marketing	All members
Consumer Perceptions	Milk Production & Marketing	All members
You’re the Director - Making	Milk Production & Marketing	All members
Healthy Lifestyle Choices - With Milk		
Milk’s Journey	Milk Production & Marketing	Junior members
I Didn’t Know that Came From Beef!	Milk Production & Marketing	Junior members

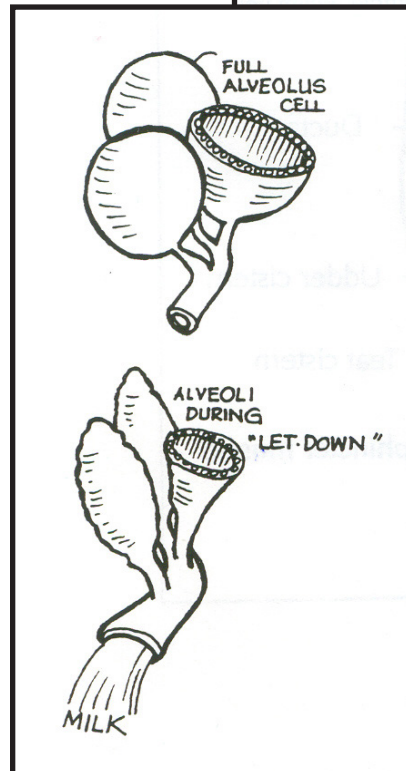
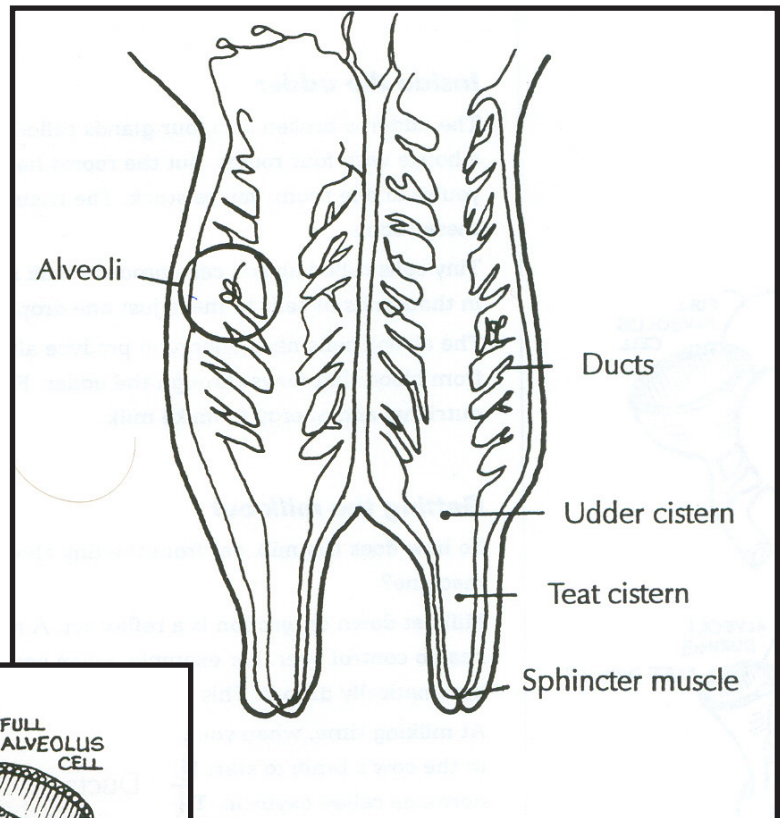
MILK PRODUCTION AND MARKETING

Milk production is a full-time job – 365 days a year – for both the producer and their herd of cows. Whether they are eating, drinking, chewing their cud, or lying down, cows' bodies are constantly making milk. It is the farmer's job to ensure that the cow and her udder are healthy due to a suitable environment and a proper milking procedure.

IT ALL STARTS IN THE UDDER

The udder is made up of four glands called quarters and each quarter is full of milk-producing tissue. While the quarters seem like different compartments, they are connected, similar to rooms in a house that do not have doors separating them. The milk produced remains in the compartment it is produced in, but it is possible for viruses, diseases and antibiotics to pass from one quarter to another.

Inside each quarter are thousands of tiny cells called "alveoli". It takes the contents of thousands of cells just to make one droplet of milk. To produce milk, alveoli need energy, which comes from nutrient-rich blood flowing through the udder. Nutrients and energy pass from the blood into the alveoli cells so they can make milk.



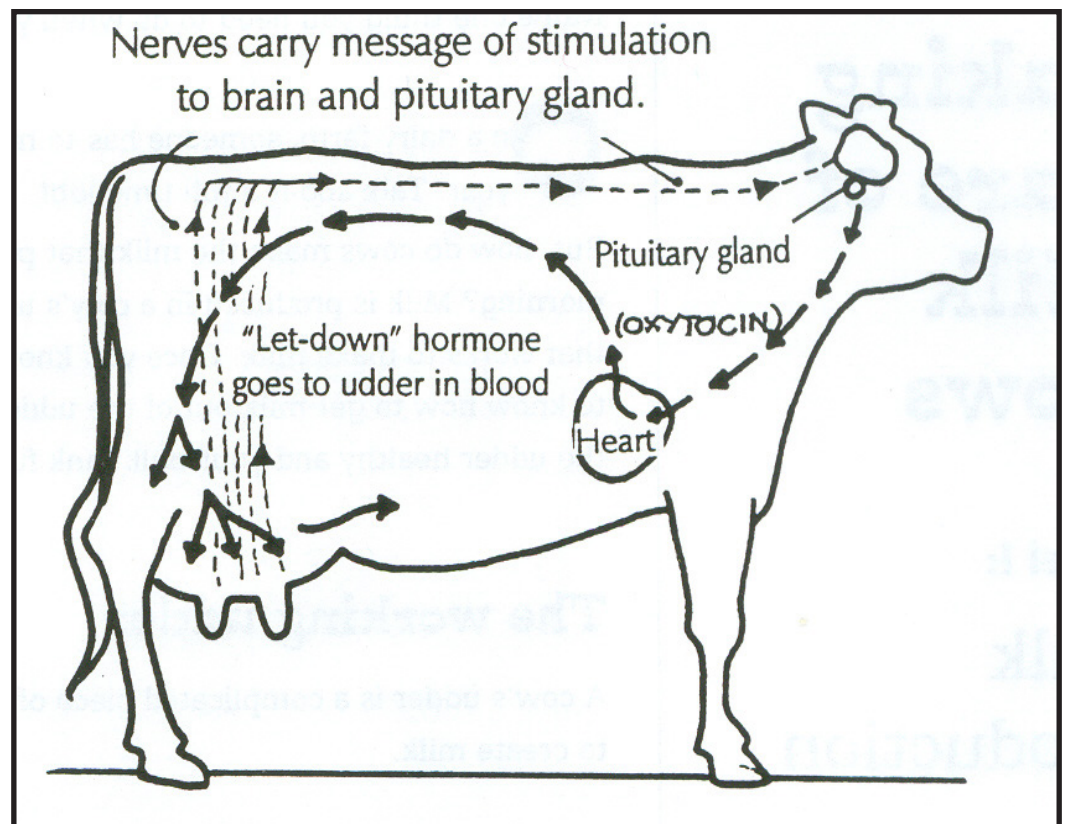
GETTING THE MILK OUT

Milk let down is an involuntary reflex action that a cow has no control over, just like when you automatically drop something hot that you pick up.

When it is time for a cow to be milked, washing and massaging the udder sends a message to the pituitary gland in the cow's brain telling her to start letting down her milk. In response, the pituitary gland sends a hormone called oxytocin through the blood to the udder. When it reaches the udder it sends a signal to 'squeeze' the milk out of the alveoli cells. When the milk leaves the cells, it travels down through the udder cistern into the teat cistern. The teats

fill with milk and then the milking claw can be attached. The teat opening is held shut by a sphincter muscle at the bottom of the teat. When the milking claw is attached, the sphincter opens, letting the milk flow out.

Cows who leak before the milking claw is put on them are often high producing cows with a lot of pressure on their teats, or they are animals that have a weak sphincter muscle that cannot be kept completely closed.



PROPER MILKING PROCEDURES

Step by Step – Proper Milking Procedures Equals 10 Steps to Happier, Healthier Cows

Now that you know how the udder works, you need to know how to milk the cow!

1. Keep Yourself Clean

The person milking the animals should have clean clothes and hands.

2. Milk the cows at the same time every day

The milking schedule varies from farm to farm. Most farmers milk their cows twice daily (2X milking): once in the morning, and once in the late afternoon/early evening. However, some farmers choose to milk their cows three times daily (3X milking) to help increase their milk production levels.

The cows should have a clean, dry environment with little stress so that they are comfortable during the milking process.

3. Wash the teats with a warm sanitizer solution or pre-dip solution

This kills germs and bacteria. It also massages the udder, sending signals to the cow's brain to tell her to let down her milk. The udder should be washed/pre-dipped and massaged for approximately 30 seconds to allow time for her brain to send the hormone oxytocin to her udder to let her milk down.

4. Dry the teats using a clean cloth or new paper towel

Drying teats keeps dirty water caused by the wash process from getting into the milk. Using a brand new towel for each cow or using a new cloth that can be washed in a washing machine after drying each cow ensures that germs, bacteria and disease are not passed on from one cow to another.

5. Squirt a few streams of milk from each quarter into a strip cup to look for any problems

Testing the milk in this simple way will let you know if the cow has a clinical mastitis infection. Since the first milk out was the milk at the bottom of the teats, it also contains more bacteria than the rest of the milk. You should discard this milk because the rest of the cow's milk (with fewer bacteria) is of higher quality.

Squirting milk out also massages the udder so the cow has more time for oxytocin release and becomes even more ready to let her milk down.

Do not squirt milk into the stall below the cow because it will allow more bacteria to grow in an area where the cow lies down or where another cow might come into contact with the poorer quality milk.

6. Attach the milking claw to the cow when her teats look full of milk (30 to 40 seconds after washing)

Timing is everything! If you put the milking claw on too soon, the cow is not ready to let her milk down. If you put it on too late, her brain has stopped sending signals to her udder to let her milk down. Putting it on at the right time causes less damage to the udder because she is ready to let her milk down and the milking claw doesn't have to work as hard to squeeze the milk out.

7. Adjust the milking claw to make sure the cow milks evenly

The milking claw should sit squarely under the quarters of the cow. If the milking claw is making a 'squawking' noise, it is sucking air and needs to be adjusted.

If the hoses connecting the milking claw to the pipeline and/or vacuum line are too short, they will pull on her udder and make the cow feel uncomfortable. If they are too long, she may step on them and pull the milking claw off.

8. Remove the milking claw as soon as the cow is finished. DO NOT OVERMILK

Getting every drop out of a cow's udder is not healthy and will make her feel uncomfortable as her teats get sore and germs can enter through the sore teat ends.

Cows usually take 4-6 minutes to milk out.

9. To remove the milking claw, shut off the vacuum to the claw and remove it

Never remove a milking claw that is still sucking on a teat because this will make the cow's teat ends sore.

10. Dip the teats in teat dip

Dipping kills germs and helps stop infections, especially during the vulnerable period right after milking when the cow's teat ends are still closing.

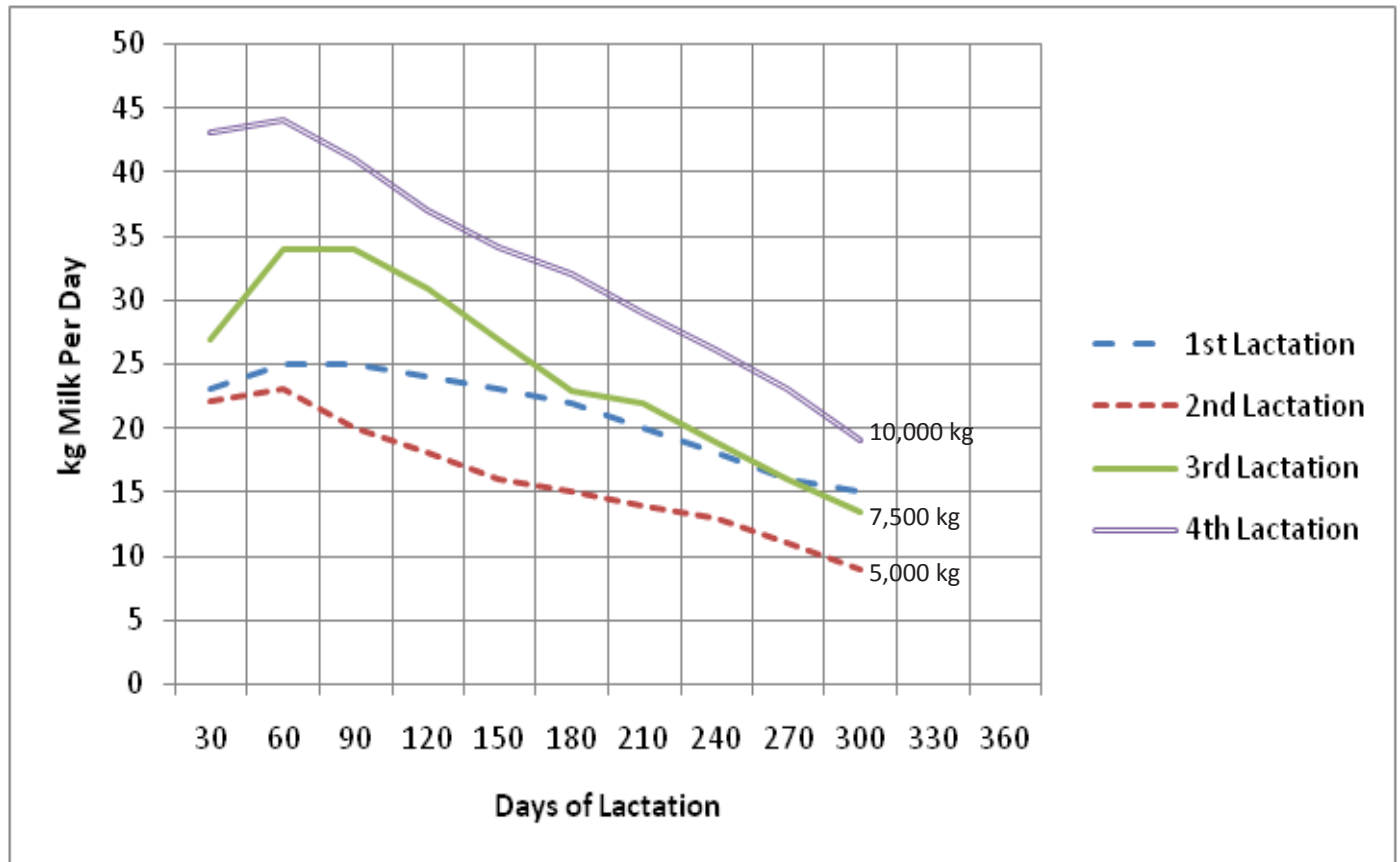
Lanolin or other moisturizers in teat dip also help to keep the teat skin soft and healthy.

The teat dip solution used must be approved by the Food and Drugs Act (Canada).

LACTATION CURVES – THE CYCLE OF MILK PRODUCTION

Just like Heifer Growth Charts are used to keep track of your heifer management program, a Lactation Curve is used to monitor the milk production of the herd and of individual cows. Lactation in dairy cattle refers to the period during which a cow gives milk after she has a calf.

The chart below shows typical lactation curves for lactating dairy cows at various levels of production. This diagram refers to milk production in kilograms, but it is also possible to track fat and protein percentages on a curve in the same manner.



From the diagram, it is possible to see that it takes between one and two months for a cow to reach her maximum milk production level, or peak production, after she calves. Once a cow reaches her peak, her milk production will drop steadily. After cows have been rebred and are four or five months pregnant, milk production drops even more quickly. The area under the curve shows the total milk production for a particular cow during a given lactation. First-calf heifers who have never given milk before will have lower peaks and less total milk production than cows who are milking on a later lactation.

The pattern of milk production for a cow depends on several factors, including genetics, nutrition, reproduction, health and general farm management. When herds and cows differ from typical lactation curves, farmers are alerted that there may be a problem and should adjust their program accordingly to maximize milk production and profitability.

QUALITY IN QUANTITY: FOOD SAFETY IS VERY IMPORTANT TO DAIRY PRODUCERS

Dairy farming facilities, animals and operating procedures are subject to stringent rules and regulations to ensure that the milk being shipped from farms is safe. Ensuring that milk is a healthy and refreshing beverage starts at the farm level.

Quality refers to producing the best possible products with consistency.

There are many things a farmer can do to improve milk quality:

- Check the milking system twice a year for problems.
- Sanitize milking equipment before and after each milking.
- Follow proper milking procedures.
- Prevent inhibitors by keeping detailed records of when cows are treated, what drug they are treated with and when their milk can go back into the bulk tank.
- Reduce high somatic cell counts by developing a comprehensive mastitis control program.
- Keep the barn and the cows inside it clean and neat.

Milk is typically picked up at the farm every other day, ensuring that it is always fresh. The milk truck driver, a licensed Bulk Tank Milk Grader, takes a sample of the milk on each farm. Milk is tested for its content of butterfat, protein, and other solids. It is also undergoes several quality tests, including:

- **Freezing Point** – The freezing point of milk (-0.54 °C) is slightly lower than that of water because of the solids in it. The freezing point varies a little bit from farm to farm and cow to cow, because each one has a slightly different component level. A farm with higher components in their milk will have a lower freezing point. Testing this temperature ensures that there is no excess water in the milk. If a farmer does not have enough milk to fill their quota and adds water to their tank to increase the milk volume, he or she will be penalized because the freezing point of the milk (and water) mixture will be too high.
- **Somatic Cell Count (SCC)** – Somatic cells are the cells that fight infection in the cow's udder. When a cow has an udder health problem (i.e. mastitis), there is a high level of somatic cells present in the milk. When the cow's udder is healthy, the somatic cell number is low, although all cows have some somatic cells present in their udder. High somatic cell counts are thus indicators of infection which leads to poorer quality milk that could spoil more quickly.
- **Bacteria** – Bacteria are germs that can make people sick. The test for bacteria is called a Bactoscan. High levels of bacteria will grow if the milking equipment is not cleaned properly or if the milk is not cooled properly and maintained at an ideal temperature (between 2°C and 4°C). Higher bacteria content results in milk that spoils more quickly.

Did you know?

The testing equipment can detect the equivalent of one droplet of contaminant (i.e. an antibiotic or inhibitor) in an Olympic-size swimming pool.

- **Inhibitors** – Inhibitors are substances other than bacterial culture that do not occur naturally in milk and hinder the growth of bacteria. In other words, inhibitors are drug residues in the milk. When a sick cow is given medicine, her milk must be kept out of the bulk tank for a length of time indicated on the label of the medicine bottle (i.e. the medication's withdrawal time) so that she can heal and the drugs have time to leave her system. If her milk is put back into the bulk tank too soon, the inhibitors will contaminate the milk. Inhibitors should be completely absent from milk samples. A positive test will result in a large fine for the farmer. To ensure that this does not happen, farmers must maintain excellent records of drug treatment.

It is critical to produce high-quality milk because quality affects the flavour and shelf life. A consumer who purchases bad milk is unlikely to continue buying the product. This reflects negatively on milk producers and the agri-food industry.

To ensure that farmers ship high-quality milk, they can be fined or lose their license to sell milk if there is milk in their bulk tank that is not safe. For instance, shipping a tank of milk with inhibitors present contaminates all of the milk that is picked up by the milk truck that day. The farmer would have to pay for the dumped truckload of milk and also would have to pay a large fine on the milk that they shipped the next month.

The following chart indicates the ranges for acceptable and unacceptable quality standards for freezing point, somatic cell count, bacteria levels and inhibitors:

Test Result Ranges			
Test Type	Normal	Elevated	Penalty
Freezing Point Estimate (FPE)	Less than -0.533 (ie: -0.534, -0.535)	-0.525 to -0.533	Greater than -0.525 (ie: -0.524, -0.523)
Somatic Cell Count (SCC)	Less than 300,000	Greater than 299,000 and less than 500,000	Greater than 499,000
Inhibitor (INH)	Negative	Trace Levels	Positive
Freezing Point (CRY)	Less than -0.533 (ie: -0.534, -0.535)	-0.525 to -0.533	Greater than -0.525 (ie: -0.524, -0.523)
Bactoscan (BSN)	Less than 36,000	Greater than 35,000 and less than 122,000	Greater than 121,000
Lab Pasteurization Count (LPC)	Less than 31	Greater than 30	-
Total Coliform Count (TCC)	Less than 11	Greater than 10	-

Source: Dairy Farmers of Ontario

Grade A is a Pass

In addition to meeting the quality standards outlined above, dairy farmers are required to keep their farms clean, neat and tidy, and to have facilities and equipment that meet standard requirements. Before milk can be shipped from a farm, a farmer first gets their license and an inspector must give the farm a Grade A rating. Inspections continue to be done periodically on the farm to ensure that the farm always meets the required standards. If the farm does not meet Grade A requirements, the farmer could face penalties and could have their license taken away. Requirements for Grade A standards are in compliance with regulations at the national and provincial levels.

Milk Quality Recognition

If farmers are penalized for producing low quality milk, is there any reward for ensuring extra high quality? The answer is yes! Producers in Alberta can be awarded with quality milk incentives based on their shipments of high quality milk.

Alberta's Quality Milk Incentives

1. Annual Quality Milk Award

The winners who receive this award have met the high standard quality raw milk standards based on:

- Bacteria count
- Somatic cell count
- Antibiotics
- Freezing point

It's estimated that over 100 producers are awarded with this award each year (although only 1 is awarded the top recipient).

2. Monthly Quality Bonus

Recipients of this bonus must meet similar criteria as above, and it is awarded, in the form of a financial bonus, to over 70% of producers per month.

Source: Alberta Milk, www.albertamilk.com

CANADIAN QUALITY MILK PROGRAM (CQM)

The Canadian Quality Milk Program (CQM) is a food safety program to help farmers prevent, monitor and reduce food safety risks on their farms. The program is based on HACCP (*Hazard Analysis Critical Control Points*) and the Canadian Food Inspection Agency (CFIA) recognizes it as applying HACCP principles on-farm to help ensure the production of high-quality milk. HACCP is an internationally recognized food safety system aimed at identifying and preventing food safety risks. Best management practices should be implemented on dairy farms to meet CQM standards.

All provinces in Canada are actively working on complying with CQM standards by making compliance part of the Grade A requirements for producers to ship milk. The provinces are working on phasing in this program from 2007-2012. Contact Alberta Milk for more information on Alberta's CQM program. Email: cqm@albertamilk.com

Some components of the CQM program that producers need to follow are:

- Standard Operating Procedures posted in milk houses.
- Time Temperature Recorders (TTRs) installed to record milk and wash cycle temperatures and times and alarm producers of problems.
- Water used for washing and rinsing milking equipment must contain zero levels of Escherichia coli (E. coli), Clostridium perfringens and coliforms.
- Medical records must be maintained, and medication inventories must be kept.
- Someone on each dairy farm must have completed a Livestock Medicines Education Course.
- Milking equipment must be assessed annually.
- Monitoring use of chemicals on farms to prevent residues in milk.
- Comply with regulations for the safe transport of animals.

More information on CQM can be obtained by contacting Dairy Farmers of Canada at www.dairygoodness.ca.

Did you know?

Alberta is the only province where enrollment in the CQM program is mandatory for all dairy farmers. This ensures that Alberta continues on with its reputation of being a top quality producer of milk.

DIGGING DEEPER - REGULATIONS

National Dairy Regulation and Code Production and Processing Regulations

Source: Canadian Food Inspection System, www.cfis.agr.ca

Just like any local 4-H club must abide by Alberta 4-H rules, which in turn must abide by Canadian 4-H Council rules, provincial dairy organizations must all meet or exceed national industry standards. These standards are outlined in the National Dairy Regulation and Code Production and Processing Regulations. This document outlines general rules related to the following areas of a dairy farm:

1. Construction, Arrangement and Operation of Production Establishments
2. Dairy Barns
3. Milking Parlour
4. Milk Houses
5. Equipment
6. Operations
7. Animal Health
8. Handling and Transport of Bulk Milk

The main features of each of these components of the dairy farm are outlined below. For more specific information, please consult the *National Dairy Regulation and Code Production and Processing Regulations*.

Construction, Arrangement and Operation of Production Establishments

(areas and yards around the dairy barn and milk house)

- Surrounding areas must be organized and kept clean and well-drained to prevent contamination of milk.
- The driveway must be accessible in all weather conditions and must not have any obstacles in the way of the milk truck.

Dairy Barns

Barns must have the following characteristics:

- Be clean.
- Be well maintained.
- Have a good, clean water source.
- Be insulated and ventilated to minimize accumulation of odours and water condensation. Manure pits located under barns must also be well ventilated.
- Adequate lighting so that udders can be seen and milking can be completed in a sanitary manner.
- The barn design must be sanitary and prevent the contamination of milk.
- Barn construction must be durable and easily cleaned with no toxic substances in building materials. Walkways and floors (other than bedding areas in loose housing facilities) must be made of concrete or another impervious material, and kept in good condition.

Milking Parlour - There are several necessary components of the milking parlour aimed at keeping the facility clean and suitable for milking purposes. Such features include:

- Access to hot and cold water.
- Equipment arranged in a manner that is easily cleaned.
- Facility that is well-ventilated.
- Heating system to prevent freezing.
- Adequate lighting so that udders can be seen and milking can be completed in a sanitary manner.
- Walls and ceilings that are easily cleaned and waterproof.
- Maintain the facility as a space that only dairy animal species are allowed to enter.
- Walkways that are well-maintained and well-drained, with traps covering drainage holes.

Milk Houses - These structures are for the sole purposes of cooling and storing milk on the farm and for cleaning, sanitizing and storing supplies and equipment related to milk production. Since this is where milk is stored and picked up, there are many features that must be included and considered:

- Location and maintenance should prevent odours from outside or adjacent barns from entering, and ensure that the building can be directly entered from the outside when the milk truck driver comes.
- Floors must be impervious, in good repair, and provide adequate drainage of rinse water.
- Sanitary hot and cold running water must be available to clean equipment; the water must not contain E. coli or coliforms.
- Ventilated to eliminate condensation and odours, with screens over windows and doors.
- Insulated and heated so that the pipes and equipment do not freeze.
- Adequate lighting with shatterproof covers.
- Washable, waterproof walls and ceilings.
- No animals allowed.
- Sinks must be available for washing equipment and for handwashing.
- Cleaning chemicals must be stored in the milk house so that there is no danger of them contaminating the milk. Other chemicals should not be stored in this area.
- Bulk Milk Tank – The large refrigerated bulk tank must be able to store milk between 1°C and 4°C, with enough space to hold 2.5 days worth of production. Milk must be picked up from the bulk tank every 2 days. Between uses, the tank must be washed and sanitized. The tank must have a dipstick to measure volume and a thermometer to measure milk temperature. The tank must also have an agitator to stir the milk. Milk must be cooled to at least 10°C within one hour of milking and to between 1°C and 4°C within two hours of milking.

Equipment – All milking claws, pipes and hoses that milk comes into contact with must be clean and in good working order. The equipment used for milking cannot be used for any other purpose. All materials milk comes into contact with must be smooth, non-corrodible, and otherwise unaffected by the milk flowing through them.

Operations – There are several day-to-day aspects of operating the dairy farm that the producer must do:

- Ensure that the dairy barn, milk house and equipment are all clean and well maintained.
- After milking, equipment must be washed and sanitized using a three stage cycle, which includes a water rinse, detergent wash and acid rinse to ensure the equipment stays clean with no build up of milk or other debris. Prior to the next milking, the equipment must be sanitized.
- Ensure that the animals are clean.
- Follow proper milking procedures.
- Manure must be removed from the milking barn daily. Loose housing barns may have a small accumulation of manure but there must be enough bedding for the animals to be kept clean.
- Standard Operating Procedures must be posted on the wall for milking equipment cleaning, sanitation and milking procedures.
- Detergents, sanitizers, pesticides, and any other chemicals must be approved for use by the Meat Inspection Act & Regulations (Canada) and Pest Control Products Act (Canada).

Animal Health

- Only dairy animals may be present in the dairy barn.
- Animals must be clean and free from disease.
- Only drugs approved by the Food and Drugs Act (Canada), the Feeds Act (Canada) and the Pest Control Products Act (Canada) may be used.
- Treated animals must be identified and records must be maintained.
- Young animals must be kept in separate pens from milking animals.

Handling and Transport of Milk

When milk leaves the farm it is handled by a Bulk Tank Milk Grader (BTMG) who has completed and passed a training course. Milk is picked up only at licensed milk production facilities that are in good standing. When the BTMG arrives at a farm, he or she makes an initial inspection of the milk (appearance, colour, odour, temperature, presence of any other abnormalities), agitates the tank for two minutes, takes a milk sample for later testing, and measures the volume of milk taken from the farm. Effort is made to maintain cleanliness when handling hoses, using the milk house hose port, and rinsing the bulk tank after the milk has been removed. If the milk is of obvious poor quality, the BTMG will refuse to pick up the load of milk and report to the producer and Regulatory Agency of the reason.

Provincial Dairy Production Regulations

While national standards must be met throughout Canada, provincial milk production organizations or regulatory agencies have developed regulations that are specific to their respective provinces. Many of these provincial guidelines involve more specific guidelines to administer the national regulations. For example, national code states that farm lanes must be accessible in all weather conditions and free of animals, locked gates and other obstacles in order to allow passage of the milk truck. Provincial guidelines may outline exactly what the dimensions of that lane must be in order for the driveway to pass inspection. Provincial agencies also regulate the implementation of the Canadian Quality Milk Program in their provinces.

To review of Alberta's provincial guidelines and regulations, go to the Government of Alberta's Agriculture and Rural Development Website, www.agric.gov.ab.ca and look up the "Dairy Industry Act" and the "Dairy Industry Regulation" policy book.

Provincial regulatory agencies are also given the right to regulate the marketing of fluid milk within their province, working within federal boundaries.

Some provinces work together to create some common rules. Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island have formed a regional pool known as the "P5" to share transportation and promotional costs for industrial or manufactured products. Fluid milk promotional costs are shared amongst Ontario, New Brunswick, Nova Scotia and Prince Edward Island. At the time of printing of this manual, formation of one joint board for these P5 provinces was under discussion.

For specific provincial regulatory or other provincial information, or to receive the most up-to-date information, please refer to one of the following organizations:

<p>Alberta Milk 1303 91 Street SW EDMONTON AB T6X 1H1</p>	<p>Telephone: (780) 453-5942 Toll free: 1-877-361-1231 Fax: (780) 455-2196 E-mail: policy@albertamilk.com Internet: www.albertamilk.com/</p>
<p>British Columbia Milk Marketing Board 32160 South Fraser Way Ste. 200 ABBOTSFORD BC V2T 1W5</p>	<p>Telephone:(604) 556-3444 Fax: (604) 556-7717 E-mail: smiles@milk-bc.com Internet: www.milk-bc.com</p>
<p>Dairy Farmers of Manitoba P.O. Box 724, Station Main WINNIPEG MB R3C 2K3</p>	<p>Telephone: (204) 488-6455 Fax: (204) 488-4772 E-mail: general@milk.mb.ca Internet: www.milk.mb.ca</p>
<p>Dairy Farmers of New Brunswick C.P. 5034 SUSSEX NB E4E 5L2</p>	<p>Telephone: (506) 432-4330 Fax: (506) 432-4333 E-mail: nbmilk@nbnet.nb.ca Internet: www.nbmilk.org</p>
<p>Dairy Farmers of Nova Scotia Suite 10, 4060 Hwy 236 TRURO NS B2N 5A9</p>	<p>Telephone: (902) 893-6455 Fax: (902) 897-9768 E-mail: jbpud@dfns.ca Internet: www.dfns.ca</p>
<p>Dairy Farmers of Ontario 6780 Campobello Road MISSISSAUGA ON L5N 2L8</p>	<p>Telephone: (905) 821-8970 Fax: (905) 821-3160 E-mail: questions@milk.org Internet: www.milk.org</p>
<p>Dairy Farmers of Newfoundland and Labrador 27 Sagona Avenue MOUNT PEARL NL A1N 4P8</p>	<p>Telephone: (709) 364-6634 Fax: (709) 364-8364 E-mail: info@nlfa.ca Internet: www.nlfa.ca/dairy-farmers.php</p>
<p>Dairy Farmers of P.E.I. P.O. Box 335 CHARLOTTETOWN PE C1A 7K7</p>	<p>Telephone: (902) 892-5331 Fax: (902) 566-2755 E-mail: dfpei@dfpei.pe.ca Internet: www.dfpei.pe.ca</p>
<p>Dairy Farmers of Saskatchewan 1-575 Park Street REGINA SK S4N 5B2</p>	<p>Telephone: (306) 949-6999 Fax: (306) 949-2605 E-mail: dfs.kelly@sasktel.net</p>
<p>Fédération des producteurs de lait du Québec Bureau 415 555 Roland-Therrien Boul. LONGUEUIL QC J4H 4G3</p>	<p>Telephone: (450) 679-0530 Fax: (450) 679-5899 E-mail: fplq@upa.qc.ca Internet: www.lait.org</p>
<p>Saskatchewan Milk Control Board 2500 Victoria Avenue, Suite 1210 REGINA SK S4P 3X2</p>	<p>Telephone: (306) 787-5319 Fax: (306) 787-1988 E-mail: milk.control.board@sasktel.net Internet: www.saskmilkcontrolboard.ca/</p>

NOW THAT THE COWS ARE MILKED . . . HOW DO WE SELL THE PRODUCT?

In order to sell milk from their farms, producers must have a license issued by their provincial regulatory authority. This license gives farmers the right to sell milk. The amount of milk that can be shipped from a farm is determined by the amount of quota that the farmer has.

The Quota System

Canada is one of very few countries that uses a quota, or supply-management system. According to the Canadian National Committee of the International Dairy Federation, supply-management is a sustainable food marketing system that matches production of milk on the farm to consumer demand. This program ensures that the amount of milk produced in the country matches the amount of milk that consumers will buy.

There are three pillars of supply-management:

1. Production Planning (i.e. domestic quotas).
2. Producer price setting mechanisms.
3. Import (border) controls.

How does supply management benefit producers and consumers?

For Producers:

- Receive a fair price for milk.
- Earn enough to cover the costs of the average dairy farm.
- Do not rely on government subsidies or taxpayer dollars to make a living.
- Have minimized transportation costs because of a centrally-planned transportation route from farm to processing facility.
- Are able to make investments in long-term housing and equipment to take care of the animals in the best way possible due to a stable income.
- Can be more profitable as a smaller farm than they would be without supply-management.

For Processors:

- Know how much milk they will get every day and how much they will pay throughout the year.
- Know that the milk is tested and of high quality.
- Can focus on their equipment and other needs to make milk products. Predictability of milk quality and quantity is like a low-risk insurance policy!

For Consumers:

- Have fresh milk and other dairy products available to them throughout the year.
- Appreciate reasonable milk prices (milk in Canada is cheaper than in the United States, which does not have supply management).

Milk marketing systems within each province are run by the province's milk marketing organization (i.e. Dairy Alberta Milk in Alberta), while national milk policies are established by the Canadian Dairy Commission (CDC) and Dairy Farmers of Canada (DFC). Provincial bodies (such as Alberta Milk) also establish the price for milk in their respective provinces.

Total Production Quota (TPQ)

TPQ is issued to the provinces in relation to the amount of butterfat needed to satisfy demand in the Canadian market. A change in demand results in a corresponding change to the quota allocated to the provinces.

When TPQ is adjusted at the producer level to reflect changes in the provincial quota, it is done on a pro-rated basis so that each producer's share of the provincial TPQ is maintained.

Producers are permitted to produce a specified number of kilograms of butterfat every day, based on their individual TPQ holdings, and are provided a production flexibility range of + 10 days to - 30 days on their cumulative quota position.

Three management options are available to producers in Alberta to ensure they maintain a cumulative quota position within the permitted flexibility range:

1. Adjust levels of production.
2. Buy or sell quota holdings.
3. Buy or sell underproduction credits.

Alberta Milk operates a monthly quota exchange. All bids and offers must be received by the Alberta Milk office prior to 4:30 p.m. at least two weeks prior to the date of transfer.

Producers are able to both buy and sell on the exchange. To sell, a producer submits an offer stating the volume they want to put up for sale and the minimum price they are willing to accept. Offers to sell at or below the clearing price will receive the clearing price. Offers to sell above the clearing price will not be successful.

To obtain quota through the exchange, a producer submits a bid stating the volume they want to buy and the maximum price they are willing to pay. Bids to buy at or above the clearing price will pay the clearing price. Bids below the clearing price will not be successful.

Alberta Milk sets the clearing price after the exchange closes. The clearing price is set at the price where the smallest difference exists between the accumulated volume offered for sale and the accumulated volume of bids to buy.

The difference between the accumulated volume offered for sale and the accumulated volume of bids to buy will be filled by Alberta Milk. From its reserves, Alberta Milk will either increase the volume of quota offered for sale, or increase it.

Quotas can also be transferred through the exchange. All quota transfers, including underproduction credit transfers, require the approval of Alberta Milk.

Producers may directly transfer total production quota holdings; however, when quota is transferred, five per cent of the quota transferred must be surrendered to Alberta Milk with exception of:

- Transfers made on the quota exchange.
- Family transfers.
- Going concern transfers.
- New producer establishment transfers.

For definitions on the above exceptions, or to review past volumes transfers and prices obtained for quota exchanges are available on www.albertamilk.com.

Source: Alberta Milk, 2009 Producer's Handbook. http://www.albertamilk.com/aboutus/_pdf/2009ProducerHandbook.pdf

Since it is difficult to ship exactly the right number every month, milk producers can earn credits. Credits can be earned in the following ways:

1. **Production Incentives Credits** – Credits issued to producers on a use-or-loose basis. Producers fill production incentive credits in the month in which they are allotted by producing above their monthly quota eligibility.
2. **Under-Production Credits** – A producer with a negative cumulative quota position holds underproduction credits. One credit is equal to one kilogram of butter fat and represents a producer's opportunity to temporarily over produce in the future.
3. **Over-Production Credits** – Producers can borrow up to a set number of quota days in order to receive payment for milk produced over their quota holdings. Over-production credits are "paid back" when a producer ships volumes of milk under his/her quota. If a farmer exceeds the number of days for their over quota credits, he or she is 'fined' through a reduction on his or her monthly milk cheque for shipping the excess milk. When milk is shipped, it first fills the monthly quota, then any incentives, then any under-production credits.

Calculating Monthly Over/Under Production

At the end of every month, each producer's total production of butterfat and their total monthly eligibility is determined.

Total production of butterfat is calculated by the producer's total volume of milk shipped and their average butterfat density during the month.

Total monthly eligibility is the sum total of a producer's monthly quota eligibility, any filled production incentive credits and any transfer of underproduction credits.

The difference between total production of butterfat and total monthly eligibility determines a producer's monthly over or underproduction. An example of how to calculate this is on the following page.

EXAMPLE	October
Total Butterfat Production	3,350 kg
Total Production Quota (TPQ)	100.00 kg/day
Days of Milk Shipped	32 days
Monthly Quota Eligibility	3,200 kg
Production Incentive Credits	0 days
Underproduction Credit Transfers	0 kg
Total Monthly Eligibility	3,200 kg
Monthly Over/Under Production	+ 150 kg

The Milk Cheque

Dairy producers receive monthly milk cheques based on the quantity, composition, and quality of the milk they produce.

Profit on the dairy farm is the difference between the milk cheque and the cost of production. Operating a well-managed farm that produces a lot of high quality, high component milk will result in the highest possible milk cheque. If production costs are also kept low, this will increase the amount of profit for the dairy farmer.

The payment for milk produced is based on a system called Multiple Component Pricing. Milk consists of 87% water - the farmer is not paid for this. Payment is made for the amounts of butterfat, protein, and other solids in the milk. The price of each of these components varies month to month, based on how much milk is being used and what products processors are using it for. Processors pay more for milk they are using for fluid milk than for some other dairy products; milk that is used for animal feed is even less expensive. Pricing is also dependent on market growth, long-term sustainability, increased efficiency and the number of other agricultural opportunities available.

The price schedules and quantities of milk sold for each purpose are factored in to result in the 'blend price' that producers receive for their milk. In July 2008, milk producers in Ontario were paid at the following rates:

Just like any other pay cheque, the milk cheque is subject to deductions. Deductions are made for things like administration fees, marketing, research, milk transportation and promotion.

Deductions are also made when producers ship milk that does not meet high quality standards. The chart on the next page indicates the penalties paid by farmers when they do not ship high quality milk. It doesn't pay to cut corners when it comes to things like cleanliness, maintenance and repair!

Milk Testing

The Central Milk Testing (CMT) Lab tests every bulk tank sample for components (butterfat, protein, lactose and other solids), for somatic cell counts, milk urea nitrogen (MUN) and freezing points.

The lab also aims to test at least eight bulk tank samples per month for bacterial cells with the Bactoscan instrument. The lab tests for drug residues once per month on a random basis. Every load of milk is tested for drug residues by the processor upon arrival at the processing plant.

Standards for Raw Milk Test Standard to Meet

Standard Plate Count (SPC)	Maximum 50,000 total living mesophyllic aerobic bacteria per ml.
Individual Bacteria Count (IBC)*	Maximum 121,000 individual bacteria cells per ml.
Somatic Cell Count (SCC)	Maximum 500,000 cells per ml.
Inhibitors and Drug Residues	Maximum Residue Levels prescribed by <i>Food and Drugs Act</i> (Canada).
Freezing Point Maximum temperature	-0.530 H

* Note: The somatic cell count standard is expected to decrease to 400,000 cells per ml in August 2010.

Milk Grade and Price Program

The Milk Grade and Price Program provides for warnings, pay statement deductions, and license suspensions and cancellations when a producer's milk quality does not meet regulatory standards. Alberta Milk administers this program under the authority of the *Alberta Milk Marketing Regulation*. Milk quality standards are set in the *Dairy Industry Regulation* and in the *Alberta Milk Marketing Regulation*.

If you have any questions regarding this summary of the Milk Grade and Price Program, please call Member Services at Alberta Milk, toll free at 1-877-361-1231.

SNF:BF Target Ratios and Zero Payment

SNF:BF ratios are a measure of solids non-fat (SNF) production relative to butterfat (BF) production and target ratios are applied to encourage producers to maintain a higher level of butterfat production.

Note: A low SNF:BF ratio means that butterfat production is high relative to solids non-fat.

If a producer's actual SNF:BF production is greater than their individual target ratio (on a year-to-date basis from August 1 to July 31), the portion of SNF production in excess of the ratio receives zero payment. Zero payment is applied monthly, but producers who meet their target by July 31 will be able to recover the lost payment.

Each producer's SNF:BF target ratio and year-to-date actual ratio is reported on their monthly milk pay statement.

Calculating Actual SNF:BF Ratio

EXAMPLE	March
Protein	3.31 kg/hl
Other Solids	5.67 kg/hl
Total SNF	8.98 kg/hl
Butterfat	3.82 kg/hl
SNF:BF	2.35

Source: Alberta Milk, 2009 Producer's Handbook. http://www.albertamilk.com/aboutus/_pdf/2009ProducerHandbook.pdf

MANAGEMENT OF MILK MARKETING

Alberta Milk is a non-profit organization established on August 1, 2002, through the approval of the *Alberta Milk Plan Regulation* under the authority of the *Marketing of Agricultural Products Act* of Alberta. Alberta Milk is supervised by the Agricultural Products Marketing Council, which is appointed by the Government of Alberta. This council supervises and regulates producer boards and marketing commissions in Alberta.

Alberta Milk represents the provinces dairy producers and is funded primarily by producers through three mandatory membership assessments: marketing, nutrition and education; research and administration.

Encouraging Milk Consumption

Alberta Milk has a marketing and nutrition website called "More About Milk" (www.moreaboutmilk.com), which offers nutritional resources such as a calcium calculator, research to support the necessity of milk in one's diet, and how to properly read a label. Recipes, as well as upcoming industry events, are also available through the website.

Alberta Milk has been involved in schools for over 50 years. What began as nutritional education resources being given to teachers has grown into elementary and high school milk programs, Club Moo and Scratch for Moo'n More, respectively. Alberta Milk also offers the Alberta "Never Stop" Scholarship for graduating high school students, as well as the Nutrition Innovation Awards for schools who improve their nutrition information.

Example of the Dairy Industry's Impact on Alberta

Alberta supplies 8.2 percent of all milk in Canada, and is said to support nearly \$2.5 billion of economic activity within the provincial economy. With 17 active processing plants in the province that means that more than 10,000 people directly (dairy producers and their families) and indirectly (veterinarians, researchers, nutritionists, equipment salespeople and milk truck drivers) rely on the dairy industry for their livelihood.

Turns out that Alberta is responsible for far more than just that glass of milk that's sitting on your kitchen table!

Source: Alberta Milk. Background: The Value of the Dairy Industry. <http://www.albertamilk.com>. Accessed June 14, 2010.

You Can be a Milk Marketer!

By choosing milk as part of your own healthy diet, and informing people you know about misconceptions surrounding milk, you can have a positive impact on milk sales.

When people hear the same positive messages about milk from dairy farmers they know, dieticians, doctors, educational programs and advertising, they are more likely to act on the messages by purchasing milk products than if they only heard the messages from one source. Promoting common themes throughout the agri-food sector is referred to as integrated marketing.

From Cow to Carton

Even fluid milk has several 'stops' to make between the farm gate and the grocery store. The most important step to remember is that of pasteurization. This is the process of heating and then immediately cooling the milk to kill bacteria, which was a process developed in the 1860s by Louis Pasteur. The Health Protection and Promotion Act makes it illegal to sell or give away raw milk.

First Stop – On the Farm

Milk travels from the cow through a pipeline into a bulk tank. The bulk tank is like a large refrigerator that keeps the milk cold and stirred until it is picked up by the milk truck driver.

**Milk on a Mission**

Every two days, a milk truck arrives to pick up the milk on the farm. A milk truck is like a bulk tank on wheels. It keeps the milk clean and cold on the way to the dairy. The milk truck driver (Bulk Tank Milk Grader) also takes a milk sample so that milk composition and quality can be tested.

**At the Dairy**

Milk is processed into different milk products at the dairy. When it arrives, it is pumped from the milk truck into an even larger storage tank. The milk is tested for flavour, odour, milk fat and bacteria. The milk is pasteurized, homogenized and processed into ice cream, yogurt, cheese, etc.

Step 1 - Pasteurization - This is the heating of milk to a high temperature and then quickly cooling it to eliminate bacteria. There are three methods:

- High Temperature Short Time (HTST): Milk is heated to 72°C for 16 seconds then cooled to 4°C.
- Batch-Holding Method: Milk is agitated and heated to 62°C and held there for 30 minutes before cooling to 4°C.
- Ultra High Temperature (UHT): Milk is heated to 138°C-158°C for one or two seconds and then cooled. Unopened products made this way will keep for months without refrigeration.

Step 2 - Homogenization – Milk from the bulk tank is a heterogeneous mixture. If it sits without stirring the cream will separate and rise to the top. To keep this from happening with milk in the store, it is homogenized. A homogenizer forces milk through tiny holes, breaking up the fat globules (cream). When the fat particles are smaller they stay mixed evenly in the milk instead of rising to the top.

Fat is also removed from the milk at the dairy and put back in at different levels to make different fluid milk options available to the consumer (i.e. 1%, 2%, whole or skim). Skim milk has almost all of the fat removed from it.

Step 3 - Vitamin Fortification – This means that vitamins are added to the milk. Vitamin D is added because it works closely with calcium to grow strong bones and teeth, and its addition to the milk helps your body absorb the calcium found in the milk. Vitamin A is also added to low fat milk products. It is a fat-soluble vitamin that is lost when fat is removed from the milk; thus, some must be added back in to get the benefits of Vitamin A, which helps improve eyesight in poor lighting and fights infection.

Step 4 - Milk that is to be made into products other than fluid milk is further processed.

**It's Ready to Go!**

After processing, milk is packaged into containers, which are stamped with a 'Best Before' date. The packages are then shipped to grocery stores. Milk cannot be sold by the grocery store after the 'Best Before' date.

WHY MILK?

Eating Well With Canada's Food Guide includes Milk and Alternatives as a vital part of a balanced diet and healthy lifestyle.

The amount of milk you should drink each day varies with your age and gender. According to the food guide, here is how many servings of milk and alternatives you should consume each day:

	Children			Teens	Adults	
Age in Years	2-3	4-8	9-13	14-18	19-50	51+
Number of Milk Servings	2	2	3-4	3-4	2	3

One serving is equal to 250mL of milk, 175mL of yogurt or 30g of firm cheese.

Helpful Hint: 30g of cheese is approximately the same size as two of your thumbs!

Canadians are encouraged to drink lower fat milk products, such as skim, 1% or 2% milk. Young children should consume homogenized milk (3.25% fat) because it aids in brain development at a young age.

Milk is important because it contains 15 essential nutrients! Essential nutrients are those that cannot be produced by our bodies so they need to be obtained from our diet. The nutrients and their benefits are outlined in the table below:

Nutrient	What Your Body Needs it For...
Calcium	Necessary for bone and tooth growth and maintenance, plays a role in transmission of nerve impulses, proper hormone function, blood clotting and muscle contraction.
Vitamin D	Enhances calcium and phosphorous utilization in the formation of healthy bones and teeth.
Phosphorus	Aids in energy release and tissue formation.
Vitamin A	Helps normal bone and tooth development; promotes good night vision. Maintains health of skin and membranes.
Riboflavin (Vitamin B₂)	Maintains healthy skin and eyes; releases energy within cells.
Protein	Builds and repairs body tissues; builds antibodies (the parts of blood that fight infection).
Magnesium	Aids in the formation of strong bones and teeth; needed for tissue formation and energy release within cells.
Carbohydrates (Mostly lactose – sugar)	Supplies energy.
Vitamin B₆	Assists in the formation of red blood cells.
Vitamin B₁₂	Contributes to red blood cell formation.

	<i>Available in smaller amounts...</i>
Thiamin (Vitamin B₁)	Role in production of energy in body cells; aids in normal growth and appetite.
Folic Acid (Folacin)	Aids in the formation of white and red blood cells.
Zinc	Aids in energy release and tissue formation.
Niacin (Vitamin B₃)	Helps normal growth and development, maintains a normal nervous system and gastrointestinal tract.
Pantothenate	Involved in the release of energy from carbohydrates as well as the breakdown and metabolism of fat.

Source: Dairy Farmers of Ontario Dairy Educator Program Activity 'Nutrients Found in Chocolate Milk'

MEETING CONSUMER DEMANDS

Dairy farmers and their provincial regulatory agencies strive to produce high-quality milk products that are completely safe and healthy for human consumption. However, some consumers have negative perceptions about milk and milk products.

In some cases consumer demands can be met by putting existing milk products in a positive light. Recently, chocolate milk has emerged as a high energy, refreshing replacement for sports drinks after physical activity, which helps to make it seem more appealing to consumers.

Fear of Fat

One long standing negative consumer perception about milk has been a fear of fat because high fat diets are considered unhealthy. Contrary to many opinions, having a low fat diet does not mean eliminating milk products. There are many low-fat alternatives for milk and milk products. Skim and 1% milk have been low fat options for a long time, but processors are creating more and more low fat products (i.e. low fat ice cream, cream cheese, yogurt and sour cream) to meet consumer demands and help to eliminate concerns about consuming dairy products. Producers have also responded to this need by breeding cattle to produce higher protein levels in their milk.

Developing Niche Markets

Consumer demands have developed the need for a portion of the milk produced to have specific characteristics, such as being produced organically. When a small market is developed aside from the mainstream market, it is referred to as a niche market. Farmers may be paid a premium for producing milk or other products that have that specific characteristic. Niche markets have emerged for kosher, halal, organic, and DHA milk products, with the two biggest niches are organic and DHA milk production.

Organic Dairy Farming Niche

Organic production is constantly increasing in popularity due to consumer health concerns about the use of chemicals and medicines on conventional farms. To respond to such concerns, some milk in the supply system is produced on certified organic farms and sold for organic milk products. This has formed a growing niche market within the dairy industry. For more information on organic dairy farming in Alberta, contact Alberta Milk.

Did You Know...

Milk that has not been pasteurized is referred to as raw milk. It is illegal to sell or provide raw milk in Canada. Before consumption, milk must be pasteurized to ensure the elimination of any harmful bacteria such as listeria, E. Coli, coxiella and yersinia.

From a milk production standpoint, all milk, both organic and conventional (non-organic), contains the same nutrient content and is subject to the same quality tests. All milk is safe for human consumption.

The difference between organic and conventional milk is that organic milk comes from dairy cows that are fed organically-grown crops and are not given antibiotics. Organic crops are grown without synthetic pesticides or fertilizers.

Third-party certifiers determine the qualifications and standards for farms to achieve and maintain organic status. The provincial regulatory agency (Alberta Milk) ensures that this milk is directed to a plant that will process it separately. All milk is paid for at the same rate from the regulatory agency, but organic producers may be paid premiums from organizations that market organic milk.

There are currently eight producers who qualify as certified organic producers.

Markets are also available for selling organic animals at a premium.

DHA Milk

DHA milk refers to milk containing docosahexanoic acid, an omega-3 fatty acid. DHA is important in the development and maintenance of the brain, nervous system and the retina of the eye. It is one of the fats that is viewed as being good for you.

DHA milk is produced by cows being fed a special diet. Cattle are fed a supplement that has DHA added. The supplement can be added to a TMR mix and fed to the cows just like any other feed would be. There are no other changes that need to occur on a farm for it to adapt to producing DHA milk.

There is not a lot of research about how being fed DHA feed affects the health of cows, but many believe that cow health could benefit from consumption of the supplement as well.

DHA milk was first sold in stores in Ontario in 2004. In 2007, 21 Ontario farms were producing 11.6 million litres of DHA milk. DHA slightly lowers butterfat content but producers are compensated for this and paid a premium for producing milk to supply this niche market.

MARKETING MORE THAN MILK

On most dairy farms, milk is the major source of income. However, there are other things that most dairy farmers have to sell. Focusing some attention on these other markets can supplement farm income and increase the value of farm production.

Breeding dairy cattle results in the replenishment of the milking herd. Dairy farmers do not usually have the space or the time to take care of all animals born on their farm, so some animals are usually sold. Animals sold fit into one of three categories:

1. **Breeding stock (including live animals and embryos)**
2. **Cull cows and bulls**
3. **Bull calves**

Breeding Stock

Canadian cattle are world renowned for their high quality genetics. Cattle, semen and embryos are sought around the world for breeding purposes.

Dairy farmers wishing to sell breeding stock should do several things in order to increase the value of their animals and thus increase their revenue from livestock sales:

1. **Raise registered cattle** – Registration papers provide a guarantee of an animal's age and pedigree (genetic background). Buyers want to know the parentage and history of the animals they are buying.
2. **Participate in supervised milk recording** – Canwest DHI (Dairy Herd Improvement) and Valacta provide undisputable data on the milk production of the animal. Buyers use this information to assess whether the animal will fit into their milk production system and meet their goals.
3. **Participate in type classification** – Classification gives the buyer an analysis on the conformation of the cow that he or she is looking at. When buying a heifer, a record of the dam's classification adds value to the animal.
4. **Be involved in the industry and breed associations** – Participate in events such as dairy shows, barn and twilight meetings, car and bus tours, county sales, and local dairy organizations or committees.
5. **Be ready for visitors** – keeping the animals clean and well fed will ensure that they always look their best for visitors and potential buyers. Hanging name signs above the cow stalls will help visitors inspect the animals.

Embryos and semen are a viable option for producers around the world seeking superior genetics. They are easier to transport than live animals and are subject to different rules for importing and exporting. When embryos are produced, they can be 'washed for export'. This means that the embryos are rinsed in a trypsin solution at the time of recovery to help prevent the spread of disease from one country to another.

When the border was closed to live cattle between Canada and the United States from May 2003 to November 2007, embryos and semen could still be sold when accompanied by appropriate documentation. In 2006, semen and embryo sales grossed over \$77 million, but probably would have been less if live animals were exported that year as well.

Live breeding stock and embryos can be sold privately, directly from the farm, or by public auction, in a specialized purebred dairy sale.

Cull Cows and Bulls

Most livestock sales on the average farm result from cull cows and bulls. On average, herds in Canada replace 28% of their animals each year.

These animals are usually sent to stockyards where they are sold for meat. Since these animals are usually older animals, they are typically used in the production of hamburger and processed meat products. Animals sold in this manner are subject to buyer demand and prices vary constantly.

Bull Calves

Bull calves are usually raised for meat purposes. Sometimes dairy farmers raise them for later sale but most dairy farmers do not have the space and time to devote to them so they are sold when they are young and raised by someone else. There are different ways these bull calves can be marketed:

1. **Bob or Drop Calves** – These are young animals that are sold through an auction or purchased privately from a farm. Animals must be several days old before they are allowed to be sold, to ensure that they are healthy and viable. Selling these young animals enables dairy farmers to concentrate on caring for their heifers and milk cows. When these animals are sold they are usually raised for veal.
2. **Red Veal** – When bull calves are kept on farm, this is a common method of raising them. The animals are fattened by eating a high energy diet and are sold for meat when they are six or seven months old.
3. **Steers** – Bull calves could be raised as steers on the dairy farm. This is not usually done unless the farmer has excess feed and space to do so. Steers are usually sold at 13 to 15 months of age when they weigh 450kg to 500kg. These animals do not bring as much money as beef breeds do when they are sold.

Agri-Tourism

Since only three percent of Canadians live on farms, there are a lot of people who know very little about dairy farming, or other types of farming. Dairy farmers can set up their businesses to take advantages of this opportunity for agri-tourism.

Some dairy operations run tours of their farms as a learning experience for school groups or as a way to educate neighbours about farming practices. Others run tours to grab the tourist market. Benefits of agri-tourism include increased farm revenue, increased public knowledge of farming, and a greater appreciation of where food comes from. One of the most popular forms of agri-tourism that has been emerging the past few years is corn mazes. Farmers can create a maze in their field and visitors pay admission to come and venture through it.

When considering agri-tourism, there are a few factors to consider:

- **Location** - Are you in an area suitable for this operation?
- **Personality** - Do you feel comfortable leading tours and entertaining people?
- **Legalities** - What extra insurance coverage do you need in case someone gets hurt?
- **Freebies** - Do not forget that you cannot sell or give away raw milk on your farm, so you need to think of a different way to attract people.

Products Derived from Dairy Cattle

While cull cattle and bulls sold from dairy farms are primarily slaughtered for beef, there are many more things that can be made from cows. When an animal is slaughtered, 98% of its body is used for some purpose. This means that there is very little waste when an animal is slaughtered.

The products made from cattle appear in all aspects of everyday life for everyone, even if they do not drink milk or eat beef. Some examples of milk products appearing in different aspects of life are:

Medicine and Health

- Sutures (stitches)
- Hormones
- Blood plasma

Food

- Meat and milk
- Milk products (ice cream, yogurt, cheese, etc.)
- Gelatin
- Marshmallows
- Gum

Household and Personal Items

- Soap
- Candles
- Cosmetics
- Combs
- Sports Equipment (i.e. golf balls)
- Bone china
- Paint brushes
- Car waxes
- Crayons
- Pet food

Mechanical and Chemical Items

- Brake fluid
- Oils
- Piano keys
- Tires
- Film
- Sand paper

VO-COW-BULARY

A glossary of Milk Production and Marketing Terms

Alveoli	Tiny cells located in the udder that produce milk.
Homogenization	The process of treating milk by forcing it through tiny holes in a machine so that the fat droplets are emulsified and the cream cannot separate from the rest of the milk.
Inhibitors	Substances other than bacterial culture that do not occur naturally in milk and hinder the growth of bacteria (drug residues in milk).
Integrated Marketing	A marketing scheme whereby common themes are promoted throughout the agri-food sector.
Lactation	The period of milk secretion following the birth of a calf.
Niche market	A small market developed aside from the mainstream market.
Oxytocin	The hormone released by the pituitary gland that initiates milk let down.
Pasteurization	The process of heating milk to a high temperature and then immediately cooling it to kill bacteria.
Pituitary gland	A gland at the base of the brain that transmits hormonal messages, such as oxytocin, to stimulate milk let down.
Processing	Putting milk through a series of industrial processes to change or preserve it.
Raw milk	Milk produced by a cow that has not yet been pasteurized.
Solids-Non-Fat (SNF)	The content of solid (non-water) components of milk that are not butterfat, such as protein.
Somatic cells	Somatic cells are white blood cells that destroy bacteria, fight infection and repair damaged tissue in the udder.
Sphincter muscle	While many animals have many sphincter muscles, in milk production this term refers to the muscle at the bottom of the cow's teat that opens to allow milk to flow out of the udder.
Supply management	A marketing system where producers control the production of a commodity.
Teat cistern	The internal part of the teat where milk is held.
Udder cistern	The internal part of the udder where milk is held once it has left the alveoli.

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References from the previous 4-H Ontario Dairy Manual.

RELATED ACTIVITIES (SEE LEADER'S GUIDE)

Types of Records	Business	All ages
Creating a Family Tree	Business	All ages
Improving Farm Management	Business	Senior members
Reading a DHI Report	Business	All ages
Who to Cull?	Business	All ages
Learning to Budget	Business	Junior members
Managing Employees	Business	Senior members
Managing Finances	Business	Senior members
Budgeting for a Calf	Business	All ages
Budgeting for Custom Raising Heifers	Business	Senior members
Farms Have Computers Too!	Business	Junior members
Computer Uses on the Farm	Business	All ages
Dairy Software Demonstration	Business	All ages
Exploring the Web	Business	All ages
Dream Dairy Farm in a Techno World	Business	All ages
Is Bigger Always Better?	Business	All ages
Farm Management Case Studies	Business	Senior members
Considering Succession Planning	Business	Senior members
Careers in Agriculture	Business	All ages

