

PRACTICAL TECHNIQUES FOR DAIRY FARMERS

3rd Edition



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ACKNOWLEDGEMENTS

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PREFACE

In this book are outlined basic procedures that are often required of a dairy farmer. Included are common sense, practical procedures learned from working with dairy animals, observing good “cowmen” and industry persons, and performing and teaching these techniques to students. Hopefully, the written text and many illustrations will provide many useful hints and technical information to dairy personnel as day-to-day tasks are performed.

Readers are cautioned not to perform any techniques that might cause injury to the animals or themselves unless they are sure of the procedure. Consult with a veterinarian or other expert if in doubt. Mention of products in this book is not meant as endorsement to the exclusion of other similar products that the author may or may not have been familiar with. Always follow manufacturers label directions when using any product. An extra label use of any drug should be done under a veterinarian’s supervision.

While many procedures are timeless, practices and recommendations change with new technologies. Always consult with your veterinarian or industry consultant for the latest information. Updates on procedures will be posted at the following website: <http://www.ansci.umn.edu/faculty/Seykora.htm>. Readers are encouraged to contact me if they have useful information that they feel should be shared with others.



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Calving Assistance

Most cows and heifers normally require no calving assistance from the herdsman. To be able to recognize the abnormal occurrence and give proper assistance, it is necessary to understand the normal birthing process.

Parturition takes place in three phases. The first is contraction of the uterus and dilation of the cervix. This phase of labor may not be noticeable in a cow, but may be seen in a heifer as abdominal pain 12-24 hours prior to calving. Dilation of the cervix depends on pressure from the uterine sacs of fluid, or water bag. This fluid also acts as a shock absorber for the calf and a lubricant to the parts. Premature rupture of this bag by an overanxious herdsman may cause incomplete or slowed dilation.

The second stage of labor is the actual expulsion of the calf. It usually begins with the appearance of the water bag. The calf has entered the pelvic area, which causes straining by the cow. It is not unusual for animals (especially heifers) to strain for a while, then stand up and move around before lying down to continue straining. Normally, the second phase may take from 30 minutes up to 3 hours for cows and 4-8 hours for heifers.

The third phase is the expulsion of the placenta, which generally occurs within 8 hours after the calf is born.

Unfortunately, calving difficulty is common (Table 1) and frequently assistance is necessary. In addition to sex of calf and age of cow, chance of calving difficulty is also influenced by sire used, condition and health and nutrition of cow prior to calving. An interesting trial showed that heifers left in a pasture and watched intermittently had less calving difficulty and stillborn calves than those confined under regular watch. One of the largest influences is an unexplained "farm" effect. Some farms pull very few calves while calving difficulty is the norm on other farms.

Table 1. Chance of Difficulty

Age of Cow	Sex of Calf	Calving Difficulty
2	Male	1 out of 3
	Female	1 out of 4
3	Male	1 out of 5
	Female	1 out of 20
4+	Male	1 out of 10
	Female	1 out of 20

Essential supplies to assist at calving (*Figure 1*) include:

1. Soap or non-irritating disinfectant to wash the genital area of the cow.

2. Plastic glove for the herdsman's hand and arm.

3. Lubricant for birth canal and plastic sleeve. This is best obtained from your veterinarian and kept on hand.

4. Sanitary nylon rope or two obstetrical chains with handles.

5. A calving jack or mechanical calve puller for emergencies.



Figure 1

The most difficult question to answer is how long should cows be allowed to strain before giving assistance. An examination of the cow can tell you a great deal and if done properly, is unlikely to cause any harm. First have an assistant hold the tail to the side or tie it off to the side with a twine. Wash the genital area with warm, soapy water. Put on a plastic sleeve and lubricate it. If a sleeve is not available, make sure hands and arms are washed and covered with a lubricating material. If the calf is presented correctly with front feet first and head in between, normal labor may last several hours. If the birth canal appears dry, apply lubricant. As long as the cow is straining and progress is being made, it may be best not to assist. It is a common error to assist too soon with too much force, causing danger to the cow and calf. On the other hand, if the feet and nose are appearing at the lips of the vulva and the cervix is well dilated then the cow should not be left more than an hour before assistance is given. If the nose is present and the tongue is extended and swollen, assistance should be started.

If the calf is in an abnormal position, use experience and judgment to determine if you can correct the situation or need to call a veterinarian. If your examination reveals that the calf is too large relative to the birth canal, call your veterinarian. A successful Cesarean section can be performed if head and front feet are still in the birth canal.

If the cow has been in labor for some time and progress is no longer being made, it is time to assist. Don't wait until the cow is completely exhausted. Place the loop of the calving rope or chains on the cannon bone and half hitch it between the dewclaw and hoof (*Figure 2*). The half hitch will distribute the stress placed on the bones during the pull. It is best to position the half hitch so the chains or rope pull from the bottom of the leg (dewclaw side). Before you begin to pull, lubricate the vagina generously with the lubricant, especially between the top of the calf's head and top of the vagina. The most common way to apply lubricant is to take a handful and push it into the vagina at a moment when the cow isn't straining. Others have placed lubricant in a plastic glove with the fingers cut off. Place the end of the glove behind the calf's skull and squeeze the lubricant into the vagina. A small diameter plastic tube 5-6 inches in length placed on a large syringe also works well and can be loaded ahead of time ready for use.



Figure 2

Front legs should be pulled alternately, so both shoulders aren't forced through the birth canal simultaneously (*Figure 3*). This requires two chains or ropes. Do not hook a single chain to both legs. A steady continued pressure can be applied with one person on each rope or chain. The pulling force should be increased as the cow strains. If cervical dilation is not complete, moderate traction will encourage dilation without risk of tearing the uterus. A constant hard pull may cause spasm of the uterine neck muscles, tearing of the uterus and constriction of the umbilical cord, which is supplying oxygen to the calf. If the vulva is very tight, it may be beneficial to manually dilate it. This can be done prior to pulling the calf by inserting your arms, palms together, and then pushing apart your elbows to apply pressure to the vaginal walls with your forearms. As the calf is being pulled, time can be taken to stretch the vulva with your hands.

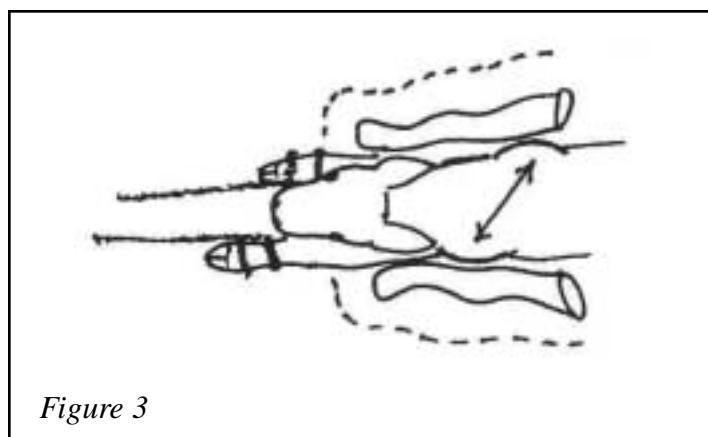


Figure 3

If the shoulders are stuck in the birth canal and no progress is being made, pull on the calf's head by putting a rope or chain behind the poll and through the mouth (*Figure 4*). Applying a moderate amount of traction on the head will help free it from the canal and reduce the dimensions of the shoulder region.

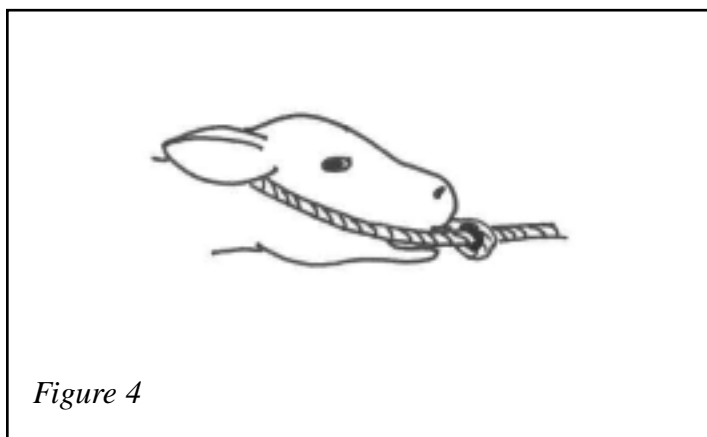


Figure 4

As the calf's shoulders emerge, take a minute to twist the shoulders and head halfway around so that the hips go through the birth canal sideways. The pelvic structure is illustrated in *Figure 5*. It is taller at A than it is wide at B. B is wider than C. By twisting the calf, the widest part of the hips goes through at a wider part of the birth canal, which should prevent hip lock. Alternatively, rather than twisting the calf, it is suggested to pull downward on the calf as its shoulders emerge. This will tend to raise the calf's hips to the top of the birth canal, which is wider than the bottom. This technique isn't as good for preventing hip lock as twisting the calf, but it is definitely easier for most people.

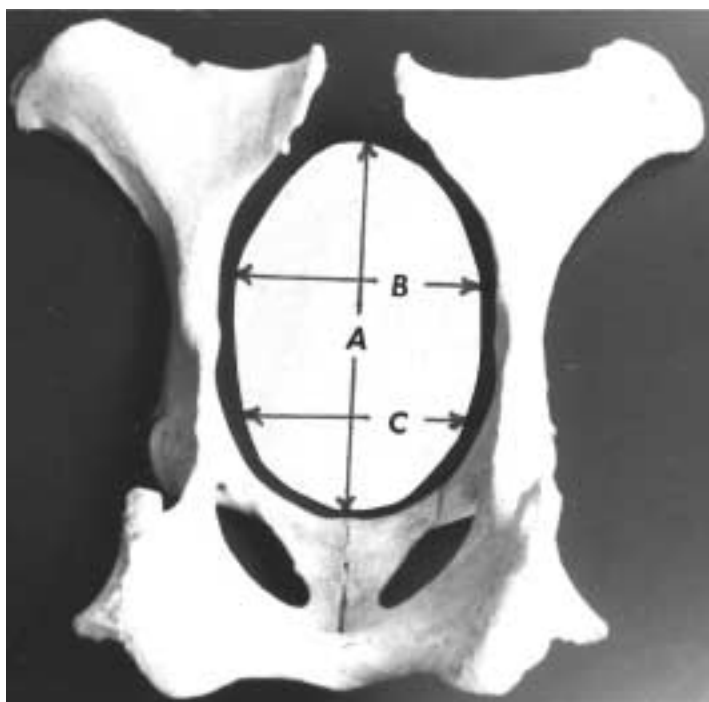


Figure 5

If the hips do become locked in the pelvic area it is a lot more difficult to twist the calf than prior to the hip lock. If hip lock occurs, stop pulling and lubricate the pelvic area and try pulling again. You can attempt to turn the calf by placing the calf's head through its front legs and pulling up towards its body. Or you can attempt to turn the calf by releasing tension on the front legs and pulling them back toward the cow and clockwise. Repeat in the opposite direction if the calf isn't released.

Another method that may work if there is ample room and manpower is to roll the cow completely over onto her back and to the other side. Make sure the calf begins breathing normally as the umbilical cord is apt to be pinched closed. After leaving her alone for a few minutes, again try assistance as the cow strains. Excessive force during "hip lock" should be avoided as it can cause damage and paralysis to the cow. It's not unusual for a stubborn case to suddenly release on its own as the hips manage to slip over the brim of the pelvis.

If the first examination reveals that the calf is coming backwards (breech), the calf needs to be taken out quickly after the hips enter the birth canal since the umbilical cord is apt to be pinched, shutting off oxygen to the calf. Breech births are more difficult than normal presentations and assistance is generally warranted. Check that the tail is lying between the hind legs. If not, reach in and pull it forward so that it isn't forced up into the roof of the birth canal. Lubricate the birth canal and attach the chains properly. Alternate traction

on the rear legs to help slip the hips through the canal. Rotating the calf a quarter turn will take advantage of the greatest diameter of the birth canal.

A mechanical puller should be kept on hand for emergencies. A puller that works off the back of the cow is preferable to a puller that is attached to a stationary object because it allows movement with the cow, traction is in the proper direction and it puts pressure on the lower part of the cow's pelvis changing the angle helping to open the birth canal. Calf pullers must be used carefully. Excessive force can easily injure the cow and calf. It is generally recommended that no more than about 400 lbs. of force be used which is about the force that two strong people can exert if pulling on a rope. Upwards of 2000 lbs. of force can be exerted with some calf jacks. Don't use excessive force as a substitute for generous lubrication and time for complete dilation.

Whether it was a difficult birth or not, as soon as the calf is delivered the cow should be offered all the lukewarm water that she wants from a bucket or pan. A cow will usually drink 8 to 12 gallons at this time and this will help avoid post calving complications. If she doesn't drink, insert a gloved hand in the uterus to check for a twin calf.

After the cow drinks water, allow the cow to lick off the calf. The mother's licking stimulates the calf's circulation and gets them standing sooner. One study showed that calves that were licked off by their mothers absorbed a greater percentage of antibodies from the colostrum. It is also believed that the amniotic fluid from the calf has an analgesic effect on the cow making her feel better after the painful birthing process. This is beneficial even if the calf was born dead.

In summary, don't assist with calving until the cervix is completely dilated - work with the cow. Cleanliness when assisting is of utmost importance. Misdirected brute force causes more harm than good. Call your veterinarian if you are unsure of the position of the calf or the proper assistance to give. Finally, it can be tiring staying up all night checking cows. Studies have shown that if close up cows are given their daily ration in one feeding, the majority will calve starting about 12 hours later. Hence, by feeding them at 6:00 - 7:00 p.m., 80 - 85% of calvings will be in daylight hours.

Resuscitating a Newborn Calf

National data collected from 1985 to 1996 for U.S. Holsteins show that 7% of calves were delivered stillborn. Cows having their 2nd or 3rd calves had a 5.7% stillborn rate. First calf heifers had a 11% stillborn rate. Calves born as the result of a difficult calving were more apt to be stillborn. For 1st calf heifers that had difficulty at calving, 27.7% of the calves were stillborn. Assistance from the herds person at time of delivery can save many of these calves.

As soon as a calf is born, its mouth and nostrils should be cleared of mucus and afterbirth. Straighten out the calf's neck so that the airways are not obstructed. The calf's situation needs to be quickly evaluated. If the calf's eye looks slightly deflated and has turned a blue, opaque color then the calf has been dead for several hours. If the calf is soiled in the rear with feces, the calf probably died during the birthing process struggling to breath. Press your hand against the chest between the front legs, if you can feel a heartbeat there is a good chance you can save the calf.

The simplest method that may produce breathing is to take a straw and insert it an inch or two into the calf's nostril (*Figure 1*). Move the straw in and out. Within 5-10 seconds, the calf may shake its head, sneeze and start breathing. This method is also recommended for healthy calves to help clear the lungs.



Figure 1

If the straw method doesn't work, give the calf what is known as the "kiss of life." Hold the mouth of the calf open, with the calf's tongue on the floor of the mouth (*Figure 2*). Blow down the calf's throat. Your breath contains about 4-

5% carbon dioxide, while normal air contains much less. Blowing carbon dioxide into the respiratory tract of the calf will act as a stimulant to initiate breathing. When performing this technique, your mouth should not touch the calf's. When working with weak or sick calves, one should always be aware of the potential of human exposure to infectious diseases. Brucellosis, Campylobacteriosis, Leptospirosis, Listeriosis, Salmonellosis, and Chlamydiosis are a few diseases that humans can catch from cattle under the right conditions. Most of the diseases have been isolated or at least implicated in weak and stillborn calves.



Figure 2

A third method to try is to briefly hold the calf up by its hind legs (*Figure 3*). Fluid may run from the calf's mouth. Most of this is coming from the calf's stomach, not the lungs. While the calf is suspended, have someone else pour cold water onto the chest and head regions. This cold shock may initiate breathing where the two previous methods failed. Variations of this include having a pail of very cold water handy and dumping it on the calf's head as it is laying on the ground. Another suggestion is to pour cold water into the ear.

If the calf still is not breathing, it is time to try artificial respiration. There are many different methods used to force air into the



Figure 3

calf's lungs. *Figure 4* illustrates applying intermittent pressure on the calf's rib cage with the calf lying on its side. Pressure can be applied simultaneously to both sides of the rib cage if you position the calf so it is lying on its chest. Applying pressure to the rib cage forces air out of the lungs. Releasing the pressure allows fresh air to enter the lungs. If an assistant is present, have him blow down the calf's throat at 15-20 second intervals. Artificial respiration can be continued for 5-10 minutes.



Figure 4

Calves can also be revived by mouth-to-mouth resuscitation using commercially available devices that protect the operator from germs that the calf may be harboring (*Figure 5*). As you blow into the calf's lungs, you should be able to see the rib cage expand. If it appears that most of the air is going into the stomach, pinch off the esophagus in the neck with your fingers. This will force the air into the trachea.



Figure 5

Many producers have found the use of a portable oxygen tank to be much more convenient. A small oxygen bottle with a regulator can be purchased from a welding supply store with about 5 feet of hose. Attach 5 inches of a small diameter rubber tube to the end of the hose. When a calf needs help, the oxygen is turned on so that it feels like a gentle breeze when the tube is held next to the operators cheek. The 5-inch tube is inserted into the calf's nose for about 30 seconds to get calves breathing. Finally, respiratory and heart stimulants are available from your veterinarian for use under their supervision. Many people have claimed good success when these have been injected.

If the heart is not beating, then the prognosis is not good. Heart massage can be given by laying the calf on its side and compressing the area of the chest between the front legs with your hand approximately once per second. At the same time, some sort of artificial respiration should be given by a second person.

The calf may be weak after normal breathing is established. Make sure the calf gets colostrum via a tube feeder as soon as possible. If the calf is chilled, supplemental heat is extremely important. Regular freeze-dried coffee crystals (not decaf) can be used to stimulate weak newborn calves. Mix 1 teaspoon of crystals per 2 oz. (1 pint is 16 oz.) of colostrum. Administer 1/2 -1 pint of the mix every hour with a tube feeder until the calf responds.

Hopefully, a few of these ideas will allow you to resuscitate the occasional calf that may need help.

Passing an Esophagus Tube

The esophageal feeder or oral calf feeder is an excellent aid to force-feed colostrum to weak, newborn calves or electrolytes to weak, scouring calves. This is a relatively inexpensive piece of equipment that can save the life of a sick or weak calf. It can be purchased fairly inexpensively so there is no excuse for any dairy not to have one or two on hand. There is always apprehension that the tube may be passed into the calf's lungs rather than into the esophagus. Fluid in the lungs can lead to mechanical pneumonia or bronchitis. Chances of this happening can be minimized if proper procedures are followed.

Proper restraint makes this task easier. Young calves can be backed into a corner with control of the head, and held adequately. It is easier to pass the tube with the calf standing up. However, if calves are too weak to stand, it can be done while they are lying down.

The esophageal feeder should be thoroughly cleaned to prevent bacterial growth, especially after it has been used for colostrum or milk. Note the ball end of the tube (*Figure 1*). This helps prevent passing the tube into the calf's lungs.



Figure 1

To open the calf's mouth, you can apply pressure to the corner of the mouth (*Figure 2*), or grab over the bridge of the nose, applying pressure to the upper palate or gums (*Figure 3*). Once the mouth is open, pass the tube alongside the

tongue to the back of the tongue (*Figure 4*). Do this slowly. You'll notice that when the tube is over the back of the tongue, the calf starts chewing and swallowing. Use this to help get the tube down the esophagus, which is situated above the trachea, which leads into the lungs. This procedure also applies to passing a hose for bloat or passing a balling gun.



Figure 2



Figure 3

Calves



Figure 4

If the tube has been correctly passed, you should be able to feel it in the esophagus (*Figure 5*). The ball on the end of the tube can be felt quite easily.

It is advisable to pass the tube almost the full length of the stiffest part. Fluid will thus go into the lower esophagus.

After the tube is passed, unclip the tube to allow the liquid to drain out of the bag. The bag can be held above the calf or hung on a nail. It will take a couple of minutes to drain. The liquid should be at body temperature to prevent temperature shock to an already weakened calf.

Buying this tool is highly recommended to increase effectiveness in feeding colostrum to weak calves and delivering electrolytes to calves with scours. The probes are available in plastic and stainless steel models. Buy what you prefer. The stainless steel models cost more but are more durable and there is no chance of the probe breaking while in use. The plastic models are more apt to become jagged and rough if allowed to be chewed on by the calf and could potentially injure the esophagus. It is easy to smooth a jagged surface using fine sandpaper and this is a recommended maintenance procedure. Since they are cheap, they should be replaced before they become excessively worn. If you have a weak calf that needs force-feeding and you don't have an esophageal feeder, then you will have to improvise. A clean pulsator hose may be just about the right size for passing down a calf's throat. It should be passed about 16 to 18 inches. Put a funnel from the kitchen on the top of the hose and you are ready to pour the liquid into the calf's stomach. This method will get the job done, but isn't nearly as safe or handy as using an esophageal feeder.



Figure 5

Identify Dairy Animals

Identification of individual animals should be standard procedure on all dairy farms. It is essential for breeding decisions, registration, merchandising, health and reproduction records, and daily management decisions. The identification systems used should provide reliability and visibility at a reasonable price.

For animals with color patterns, a photograph or sketch provides a permanent means of identification (*Figure 1*). The disadvantage of this method is that they are difficult to carry around and use daily.



Figure 1

Plastic ear tags are one of the most popular forms of identification. First, select the style of tag to be used. Larger tags are easier to read from a distance and usually aren't any more apt to tear out or break off than smaller tags. You can buy pre-stamped tags, or you can number your own (*Figure 2*). The advantage of numbering your own is that you may also include birth date, sire, and dam on the front or back of the tag. The numbering system chosen may tell you something about the calf. For example, 9309 is the ninth calf born in 1993. You may wish to use different colored tags. For example, grades may get red tags and purebreds yellow tags. Each tag manufacturer makes a specific ink for their tags. Some of these inks have a chemical base that allows them to etch or melt into the polyurethane tags. These new inks won't fade like a typical "magic marker" would and are worth the small additional cost. These ink pens may come

with interchangeable broad and fine tips. Buy the ink specific for the company's tags. The ink from one company may not work well on another company's tags because the composition of the plastic may be different.



Figure 2

To tag an animal, restrain it and insert the tag into the applicator. Placement of the tag in the ear will depend on the style of tag used.

Generally, tags should be placed in the middle of the ear between the cartilage ribs, approximately one-half the distance from the base to the tip of the ear (*Figure 3*). The tagger pliers are calibrated to apply the tag without getting the tag too tight. Avoid the temptation of manually squeezing the button and tag together for a tighter fit after the pliers are removed. This will result in restricted blood flow to the wound and may result in the tag being sloughed off. Putting the tags in before the calf is taken away from the dam will prevent a mix-up later. Treat the wound with an antiseptic to prevent an infection and repel insects. Disinfect the applicator between animals if there is any danger of transmitting any blood-borne diseases. If there is a tendency for animals in your herd to lose tags, you may wish to tag each ear. Some dairymen have resorted to using smaller tags designed for swine with good results.

Tattooing gives a permanent means of identification, although the animal usually has to be restrained to read the tattoo. A suggested procedure includes:

1. Place the numbers in the tattoo pliers. If in doubt, check the numbers on a piece of cardboard to make sure they are in proper sequence.
2. Wipe the area to be tattooed with an alcohol-soaked cloth or cotton ball. The tattoo is usually placed above the top cartilage rib. The area between the two cartilage ribs is



Figure 3

generally reserved for a bangs vaccination tattoo, or may be the side for ear tagging.

3. Using a disposable plastic glove, apply a very thin film of paste ink to the ear. Ink paste is generally preferred to liquid ink.
4. Position the tattooing pliers in the ear and squeeze firmly for 30 seconds (Figure 4).



Figure 4

5. Remove the pliers and rub the ink paste into the tattoo for 30 seconds.
6. Equipment should be disinfected between calves.

An aid in reading tattoos in dark ears is to shine a flashlight on the back of the ear while reading it from the front (Figure 5).

Ankle bands have been gaining popularity for cows milked in herringbone parlors (Figure 6). The band is applied



Figure 5



Figure 6

around the rear leg when the heifer first enters the milking string. It should be applied tight enough to remain on, but loose enough so it doesn't restrict blood flow. The major disadvantage to bands is that bands can get dirty which make them difficult to read.

Two other popular means of identification include neck chains and freeze branding. Neck chains are easy to apply and are fairly visible. If put on calves, they need to be adjusted as the calf grows. Freeze brands give permanent identification and are easily read if of good quality. Disadvantages are that occasionally a number will not come out clear, and more time and labor are required to do freeze branding than other means of identification.

Freeze Branding for Permanent Identification

Freeze branding is gaining popularity as a method of identification in dairy cattle. Freeze brands can't be lost like an ear tag or neck chain. They are easily read from a distance, can be read in milking parlors (*Figure 1*), and do not damage the hides as hot brands do.



Figure 1

The most common method of cooling the irons is with liquid nitrogen. Pour 4-5 inches of the nitrogen from a storage tank into an ice chest (*Figure 2*), using proper caution to avoid splashing it into your face. The liquid nitrogen will boil as the relatively warm irons are placed into the liquid. After 5-10 minutes, the irons will have cooled down to the temperature of liquid nitrogen (-197°C) and boiling will stop. The irons are now ready for use. Most people prefer to wear gloves when handling the cold irons.

Freeze branding works best when applied to dark hair. It works by killing the pigmentation cells, so white hair replaces the dark hair where the brands are applied. If applied on white hair, the irons are held in contact with the skin for a longer period of time to kill the hair follicles. Branding on dark hair usually gives a much more satisfactory brand. The best areas to brand are on the rump, upper thigh or over the loin, because these areas are firmer and ensure better iron-to-skin contact. People with herringbone milking parlors may wish to brand both sides of their cattle.



Figure 2

After a site has been chosen, use a surgical blade on an electric hair clipper to clip against the lay of the hair to remove as much hair as possible (*Figure 3*). To increase iron-to-skin contact, pour 99% isopropyl alcohol over the shaved area immediately before applying the irons (*Figure 4*). 99% isopropyl alcohol can be purchased through your veterinarian or other supplier. Rubbing alcohol typically is only 70% alcohol. Use enough alcohol to saturate the skin.

Properly restrain the animal in a squeeze chute or with a tail hold if the animal is haltered or in a stanchion. Remove the iron from the liquid nitrogen and immediately apply it firmly to the animal (*Figure 5*). Make sure that all portions of the face of the brand are in contact with the hide. Lack of pressure or uneven pressure can result in poor brands. The animal may jump around for the first 10 seconds after which the area becomes numb and the animal will usually calm down. Each iron needs to be applied for 20 seconds with dark hair and 2-2 1/2 minutes with white hair. (Brands on white hair are marginal at best.) After the allotted contact time, the iron needs to be returned to the liquid nitrogen until bubbling stops before it is used for another brand.

The most common cause of failure is from not applying the iron for the proper length of time. Time yourself, don't guess! When the iron is pulled off, it should leave a frozen



Figure 3



Figure 4

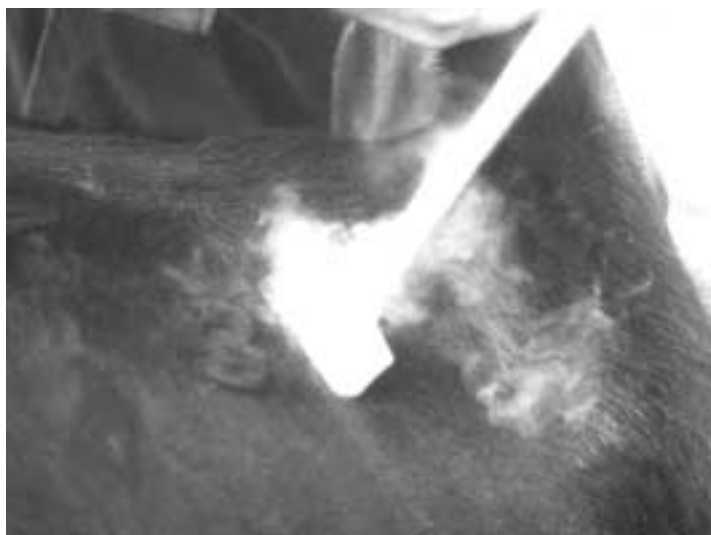


Figure 5

imprint of the number, as in Figure 5. If not, you didn't apply the iron long enough or with enough pressure. After a few minutes, the imprint will swell and welt up. Generally, after a couple of weeks, the hair and outer layer of skin may slough off leaving a bare spot. The dark hair is replaced with white hair as the hair grows out. This may take 2 months.

The above procedures have given consistently good results on Holsteins from 3 months to 10 years of age. There are alternative procedures and contact times that have worked well for other people. These include different contact times than suggested here such as 5 seconds for 1 month old calves; 8 seconds for 2-3 months; 10 seconds for 4-8 months; 13 seconds for 9-18 months; and 15 seconds for over 18 months. Experiment to find the contact times that work best for you. Beef cattle have thicker hides and require longer contact times. Jerseys require less contact time.

Freeze Branding Irons come in sizes ranging from 2 to 6 inches. It is common to freeze brand 4-6 month old calves using the 2-inch numbers. As the calves grow, the numbers will expand. The 4-inch size is often used for cows. Size of brand used is a matter of personal preference and is dependent somewhat on from what distance the brand needs to be read.

If liquid nitrogen is unavailable, alcohol and dry ice can be used to cool the irons. Since this mixture is not as cold as liquid nitrogen, add 15 seconds to the length of time the irons are applied.

The largest cost involved in freeze branding is purchasing the irons. They range from \$100-200 for a set. You may be able to borrow irons from an A.I. representative. It takes about 5 quarts of liquid nitrogen to do 20-25 animals. Freeze branding is an excellent form of identification if done properly.

Managing Hutches in the Winter

Cold, damp weather puts additional stress on the newborn calf. Even under the most adverse weather conditions, a calf hutch can still be the most desirable system under which to raise a calf, if the calf has a dry, draft-free place to lie and an adequate energy intake.

Place hutches so they face the south or southwest in winter. This protects calves from the cold northwestern winds and allows the sun to penetrate the hutch. Never locate hutches near barn exhaust fans, as this will expose calves to pathogens from the barn. It is important that hutches have a thick bedding base, to allow for drainage and to insulate the calf from the cold ground. Straw or chopped cornstalks make excellent bedding because of their absorbent properties. Placing the bedding on a 4 to 6-inch base of corncobs makes an excellent bed.

It is generally recommended that hutches should be thoroughly cleaned and disinfected between calves. Many dairymen, however, report good results with cleaning after every 2 calves in winter. Use the system that works best for you.

After a calf is born, the navel should be dipped in iodine and tied to prevent navel ill. Surveys have shown 10 to 15% of untreated calves get navel infections which decrease performance. Allow the mother to lick off the calf. Feed the calf colostrum within 30-45 minutes of birth while the calf is still with the cow. The amount fed should be at least 5% of its body weight (about 2 quarts.).

Most experts recommend that calves be placed in hutches as soon as they have received their colostrum and been dried off (*Figure 1*), even in cold weather. Others have had good results with keeping the calf inside for a few days or until the weather moderates. By moving the calf out immediately, it will be exposed to fewer disease-causing organisms. A newborn calf will generally have more body fat than a calf 2-3 days old, so it adjusts easier to the cold weather. Don't put a calf already weak or chilled out into a hutch.

During periods of extreme cold or blowing snow, it may be advantageous to partially block the front of the hutch of the newly arrived calves with 2 bales of straw (*Figure 2*) or other barrier. The barrier need only remain for a day or two, and under no circumstances should the opening be completely blocked. The barrier will help block the wind and snow, and keep the calf inside.

Generally, calves should be fed milk at the rate of 10% of their bodyweight per day. This means that a 120 lb. calf gets 12 lbs. per day while a 80 lb. calf gets 8 lbs. per day. A two-



Figure 1



Figure 2

quarter feeding provides 4.3 lbs. When temperatures fall below freezing for extended periods, calves will need additional energy to maintain body temperature and still have an acceptable growth rate. Following are general guidelines: if average daily temperatures are expected to be around 25° F, increase milk intake by 1 pint or milk replacer powder by .1 lb. per day; at 15° F increase by 2 pints or .2 lbs. of powder; at 5° F increase by 3 pints or .3 lbs. of powder by adding a third feeding per day. Be consistent in feeding, don't change amount fed just because the weather moderates for a couple of days.

Make sure the milk is warmed to 105° F when fed. Cooler milk will cause the calf to expend energy to warm it. Carry

Calves

the milk out to the calves in insulated containers, if necessary, to keep it warm. Milk replacers, if used, should be high quality with 20% fat, 20% protein and less than .5% fiber. Encourage calves to eat a grain mix as soon as possible.

Observe calves frequently for alertness and general condition. Because of long winter hair coats, it is difficult to tell the condition of calves visually. Make it a habit to run your hand over the calf's back each time it's fed (*Figure 3*). If you note that a calf is losing body condition, try to increase its energy intake. Hutch calves that do become sick in winter should be moved inside to a warm environment. It is difficult for a sick calf to get well in a hutch at 0-20° below. If the calf is cold stressed, remedial measures should begin at once (*Figure 4*).

If the hutch is 8 ft. deep and there are no openings or cracks in the back, snow generally doesn't penetrate more than a few feet. Shovel the snow out promptly so the calf doesn't track it onto the dry bedding. If bedding becomes damp, add bedding. A good test is to sit down where the calf lies. If your pants become wet, add bedding.

Many people have had good success raising calves in domed hutches (*Figure 5*) during cold weather. The calf doesn't track snow onto the bedding, and is protected from the wind. The ventilator cap should be adjusted to provide enough ventilation to prevent condensation inside the hutch.

A "calf jacket" is a good option for calves in the winter. These are commercially available blankets that are put on the calves



Figure 3

Cold Stress (Hypothermia)

Symptoms:

Decreased body temperature (5-10° below normal).
Ears and legs cold.
Loss of vigor and appetite.
Shivering. Hair standing on end.
Stiffness. Stand with head down and feet together.
Lying down most of the time.
Sudden death of the calf.

Remedy:

Bring calf in out of cold.
Bring calf's body temperature back to normal (101.5°).
a. immerse in warm water (105°) and/or
b. vigorously rub with dry, warm towels
c. provide warm, draft-free environment (heat lamp or heat-pad)
Give two quarts of warm milk. Tube feed if the calf is weak.

Prevention:

Provide calves adequate energy intake.
Provide dry, draft-free environment. Calves can become cold stressed in wet, drafty barns as well as in hutches.

Figure 4



Figure 5

when put out in the hutch and taken off when weather moderates or after the calf is weaned and eating well. Calves expend less energy maintaining body weight and hence have increased growth rates and are less stressed during cold winter months. The jackets need to be cleaned between calves, straps kept adjusted, and hutches still need adequate bedding.

Another management practice is to place the calf hutches inside a shed during the harshest winter months. This offers additional protection for the calf and makes calf chores a little more pleasant.

Many of these recommendations will help raise healthy, growthy calves under harsh winter conditions as well as under moderate conditions.

Removing Dewclaws

Removal of the inside dewclaw is not widely practiced. Yet a few dairymen and veterinarians feel that it will reduce mechanical injury to the teat and udder. They have routinely removed calves' dewclaws for years. It is a relatively safe and easy procedure, especially if it's done at a young age. *Figure 1* shows a cow with the inside dewclaw removed.



Figure 1

As with most surgical procedures, it is best to remove the dewclaws at a young age. Many farmers perform the procedure immediately after removing the calf from the cow. The calf is much easier to control at this time so only one person is needed for the job. Also, bleeding is minimal.

Restrain the calf by laying it on its side. Use an all-purpose, heavy duty shears to cut off the dewclaw (*Figure 2*). If done properly, there should be hair all the way around the removed dewclaw (*Figure 3*). If not, make another snip with the shears. If the dewclaw is not completely removed, it may grow abnormally and may cause more damage than a normal dewclaw.



Figure 2



Figure 3

Take several precautions to lessen the chance of infection. Make sure the shears are clean and sanitized prior to use. A disinfectant spray or dressing should be applied to the wound (*Figure 4*). A fly repellent spray should be used in the summer. Probably most important, make sure the calf is in a clean, well-bedded pen.



Figure 4

If done at a young age, bleeding from the wound will be minimal. However, calves should be watched to make sure that they don't bleed excessively. On a very small percentage of calves, it may be necessary to pack the wound with cotton held in place by several wrappings of gauze (*Figure 5*).

Place tape over the gauze to finish the bandage or use vet wrap over the cotton pack. Do not wrap the tape too tightly or you'll cut off circulation to the foot. Remove the bandages in 2-3 days.

Calves

You can also use a Barnes dehorner to remove dewclaws. It may be best to use it on older calves. *Figure 6* shows the sanitized gouge dehorner positioned around the inside dewclaw. It is important to get all around the dewclaw. To help avoid cutting too deeply and possibly injuring the underlying tendons, place the gouge around the dewclaw and tighten enough so that you can pull outward as the handles are quickly spread to close the blades.

Using the Barnes dehorner requires more skill than using the shears. The older the calf, the more restraint required; and more bleeding and trauma expected.

Removing dewclaws may reduce teat injury and bruises to the udder if your herd has these problems. It is not known what percentage of such injuries are caused by the dewclaw.

Removing dewclaws may significantly improve udder health of some herds but have no benefits in others. Level of benefit would be influenced by type of housing and depth of udders. If in doubt, try removing the dewclaws of every other heifer born. When these heifers freshen, monitor the difference in incidence of teat injury, mastitis incidence and somatic cell count between the two groups.

Generally, only the inside dewclaws on the hind legs are removed. Obviously, relative to udder injury, the inside dewclaws are the ones that cause the problems. However, some dairymen remove both dewclaws on the hind legs for a more pleasing appearance.

If you adopt this procedure, remove the dewclaws when calves are young. Do it correctly under sanitary conditions. If done incorrectly or if an infection results, any beneficial aspects of dewclaw removal will be negated and the calf may suffer. It is always a good idea to consult your veterinarian before trying a new procedure.



Figure 5



Figure 6

Removing Extra Teats

Dairy heifers often have extra teats (supernumerary) in addition to the normal ones. Supernumerary teats present no problem if removed when the calf is 1-2 months of age. If left longer, an operation using anesthetics may be necessary. If not removed, extra teats may interfere with teatcup placement, become an extra functioning milk gland, or become infected. At any rate, extra teats detract from an udder's general appearance.

Removing extra teats is a simple surgical procedure, but must be done right for satisfactory results. In a well-lit area, have someone hold the calf securely on its side with its hind legs held apart. Normal teats are those which are properly placed and usually a bit larger than the extra teats. One to four extra teats may be present. The heifer in *Figure 1* had two extra teats behind the four normal teats. Extra teats may also appear between the normal teats. If there's doubt as to which teats to remove, postpone the operation until there's more udder development or just leave them alone.

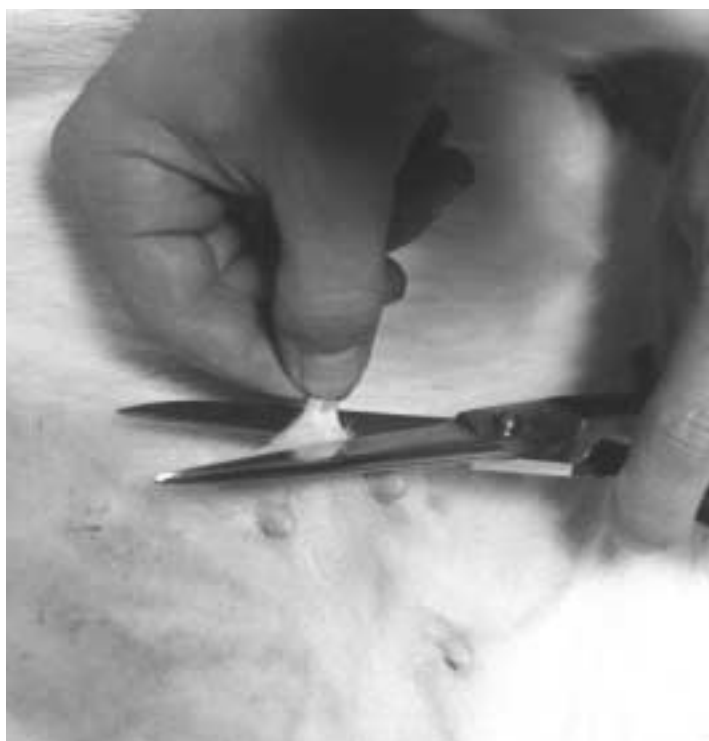


Figure 2

Grasp the teat between your thumb and forefinger. Even in small calves, the nerve supply to their teats are well developed. Make sure the calf is well restrained before you proceed. Pull the teat outwards and take a generous bite with the scissors (*Figure 2*).

The most common mistake is not removing enough of the teat. Often, the teat is cut off level with surrounding skin or even less is taken. This can leave a lump or scar which may increase in size as the heifer grows. Taking a generous amount of the skin surrounding the teat also ensures complete removal of the budding milk gland. A comparatively large elliptical wound about the size of a dime should result (*Figure 3*).

An alternate method of removing teats is to pull the teat outward and clamp artery forceps on the udder above where the cut will be made. Then, slide a scalpel along the forceps and remove the teat, leaving the forceps attached to the skin of the udder. When the forceps are removed, bleeding will be minimal.

Dress the wound liberally with a tincture of iodine (*Figure 4*) or antibiotic ointment. The calf's pen should be clean and well-bedded to prevent infection.

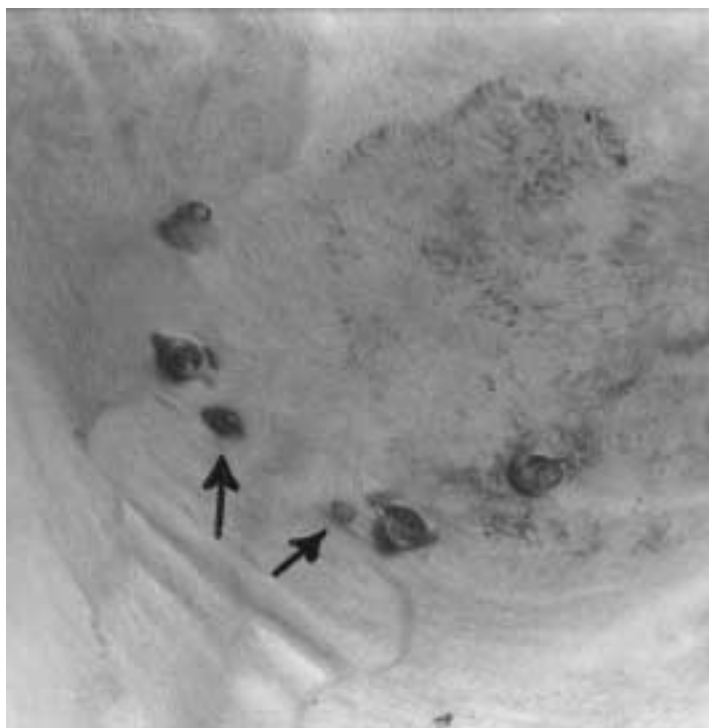


Figure 1

Scissors or a scalpel may be used, but scissors are most preferred because there is less chance of cutting yourself or the calf if the calf should move. Generally, the sharper the scissors are, the easier the job can be accomplished, but scissors don't need to be razor sharp. Actually, slightly dull scissors tend to crush the blood vessels as they cut. This minimizes bleeding, although bleeding is not a big problem for this operation.

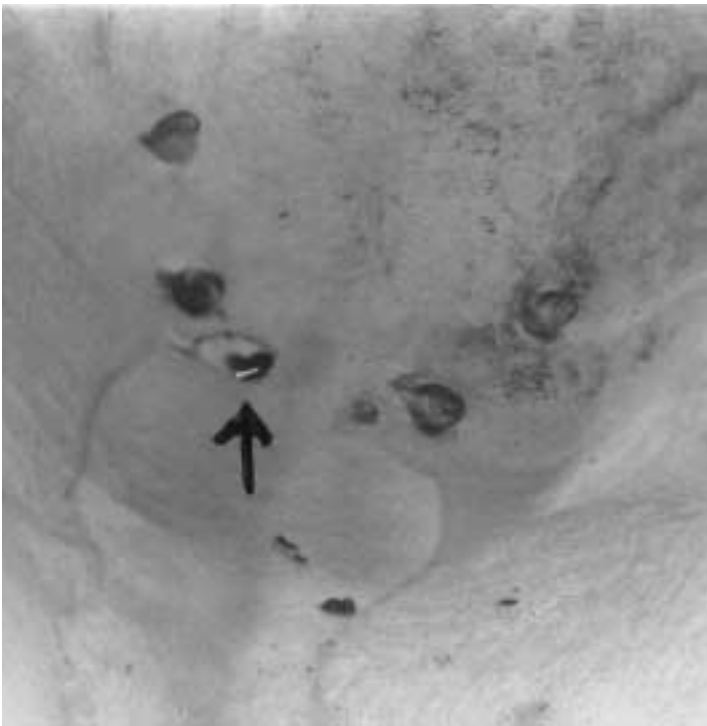


Figure 3

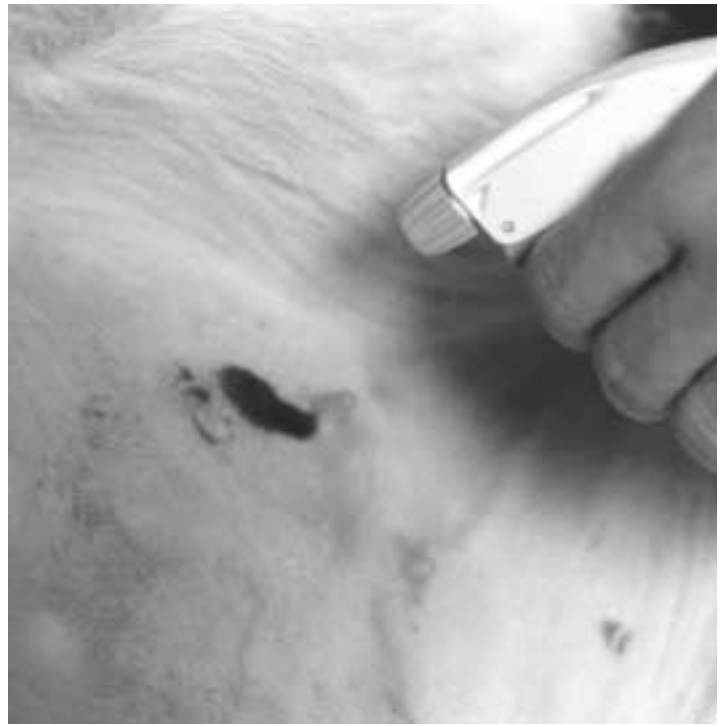


Figure 4

Tail Docking

Tail docking is becoming more widely accepted by farmers in both freestall and stall barns (*Figure 1*). Reasons for docking include added cleanliness of cows, ease of milker attachment in parallel parlors, and reduced chance of the farmer getting swatted in the face. Research results comparing cows with and without tails have yielded mixed results. One study showed that heifers with docked tails on pasture had more flies on their backs. Another study showed no improvement in cleanliness or udder health for cows with docked tails. Practical experience would indicate that in many housing situations cows with docked tails will be significantly cleaner. There are no studies that say tail docking has any effect on performance or production.

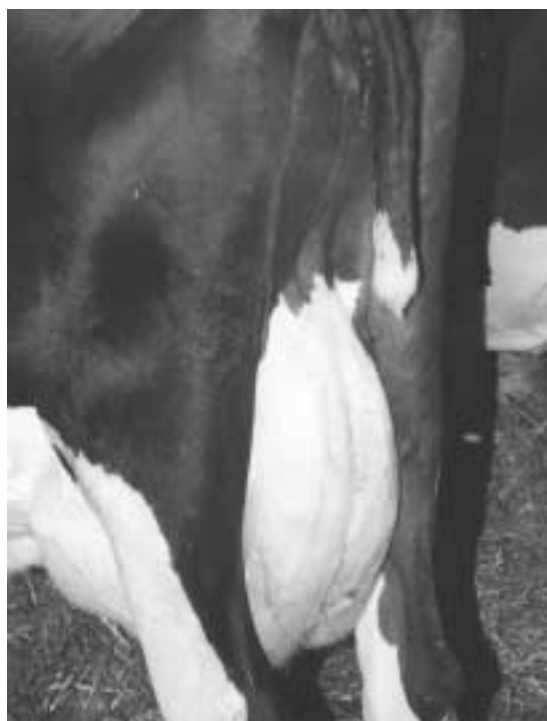


Figure 1

Some people object to the docking of tails for humane reasons. In fact, the practice of docking tails is banned in Great Britain. Others see no difference between docking cattle compared to docking the tails of pigs and sheep or the dehorning of cattle.

Tail docking is a relatively simple procedure and there are several different methods used. Producers dock tails at less than a week of age, at time of dehorning, at first breeding, or as freshened heifers enter the herd. Some producers only dock the tails of “problem” cows. Docking seems to cause very little or no stress on the animal.

The most common method of docking tails is the use of elastator bands. In young calves the band is placed three finger widths below the bottom of the vulva (*Figure 2*). In cows the band is placed two hand widths below the vulva or at the top of the rear udder attachment (*Figure 3*). Docking the tail too short may result in an increase in vaginal infections as a cow may stick her tail into the vulva. A tail that is left too long can be a nasty weapon without a switch. The rubber band should be placed between the vertebrae. The tail will fall off in two to four weeks. Following are variations of this procedure:



Figure 2



Figure 3

1. Some people prefer to place two rubber bands on the tail.
2. One option is after the band is on for four or five days, is to cut off the dying tail with a hoof trimmer or knife immediately below the band.

3. Another option is to put the band on in the morning and cut the tail off one vertebrae lower in the evening. The rubber band is cut off three days later.
4. To facilitate the placement of the band, some people load the bands onto a 1.25 to 1.75 inch PVC pipe. Slide the pipe up the tail and then slide the band off the pipe into the tail (*Figure 4*).
5. If tetanus is a concern, two tetanus vaccinations can be given. The first is given two weeks before and the second is given on the day the band is put on. This is not a concern on most farms.



Figure 4

Some people prefer not to use rubber bands. An option is to clamp a “Burdizzo” a few fingers below the vulva on a calf less than a week old (*Figure 5*). Cut the tail off with a sharp knife or scalpel below the clamp. Remove the burdizzo 30 seconds later and bleeding should be minimal.

A veterinarian from Canada recommends the following procedure for removing tails from cows:

1. 18 mg. of xylazine with 6 ml. of saline is given epidurally in the tailhead to numb the tail.
2. The tail is washed at the place of incision with a chlorohexidine soap.
3. A scalpel is used to make a skin incision a little lower than the joint.
4. A Mayo scissors or shears is used to sever the tail at the joint.



Figure 5

This method should only be done by a veterinarian.

Surgical Castration

Surgical castration guarantees that there will be no unwanted pregnancies when running “steers” and heifers together. If properly performed, surgical castration causes less pain in the long run than other methods. The pain involved lasts for a brief period. With non-surgical techniques, the animal is uncomfortable for days. To minimize pain and stress, calves should be castrated at 2-3 months of age.

One of the preferred methods of castration is to cut off the lower one-third of the scrotum so the testicles can be removed. Equipment required is a sharp scalpel and a pail of warm water with an antiseptic. Sanitize hands and scalpel after each calf. Change the solution if it becomes contaminated or after 10-15 calves.

On a young calf, a tail hold with the calf’s head in the feed bunk is usually adequate restraint. A proper tail hold is in an upward as much as a forward direction. This stretches the tendons in the legs and reduces the chance for kicking. Do older calves in a squeeze chute.

Once the calf is restrained, check both testicles to make sure there are no abnormalities such as ruptures or undescended testicles. A veterinarian should castrate any calf with a rupture.

If the examination reveals no abnormalities, grab the bottom of the scrotum with your thumb and forefinger (*Figure 1*). With the scalpel, cut off the lower one-third of the scrotum, exposing the testicles (*Figure 2*). Take hold of a testicle. At this point, do not let it slip back into the body as this will increase the chance of infection. The testicle will be rounded on one side and relatively flat on the other. You will want to cut through the membrane on the more rounded side of the testicle. Take the scalpel and continue splitting the membrane covering the testicle (*Figure 3*) until you can pop out the testicle. Separate the membrane from the testicle. The membrane should remain connected to the bottom of the testicle. Next cut off the membrane above the testicle (*Figure 4*). By cutting away as much of the membrane as possible, excessive swelling and inflammation will be prevented.

The testicle now is supported entirely by the spermatic cord. Take hold of the testicle and extract it with a slow steady pull. Stretching the cord in this way stretches and tears the blood vessels which minimizes bleeding. Cut off any remaining cords or tissue hanging down with the scalpel.

Repeat the same procedure with the other testicle. After you have completed removal of the second testicle, spray the wound with an antiseptic.

The use of emasculators simplifies the procedure and is definitely recommended to help reduce bleeding when castrat-



Figure 1



Figure 2

Bulls

ing older calves (5-6 months). After cutting off the bottom of the scrotum, grasp both testicles and pull down. Place the emasculators as high up on the spermatic cord as possible and cut. The crushing side of the emasculators should be toward the body.

There are a few precautions to keep in mind. There is a major blood vessel on the inside of the calf's hind leg. Be extremely careful not to accidentally cut this vessel, as bleeding may be difficult to control. Provide a clean environment for the calves and observe animals for scrotal infections. Infection may occur 1 to 2 weeks after castration and should be treated by draining the wound and administering antibiotics.

There are other methods of surgical castration. The method described here has worked successfully in keeping bleeding and stress to a minimum.



Figure 3

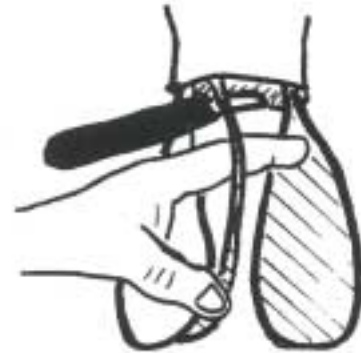


Figure 4

Bloodless Castration

Bloodless castration of calves is preferred by many dairy people because it reduces the risk of open wound infection and parasites. There are three major methods of bloodless castration: the elastrator (bands) for small calves, banders for larger bulls, and the Burdizzo® (emasculatome). There are several steps you can take to assure a good job of castration by these methods.

Castration with the elastrator is accomplished by placing a band around the scrotum above the testicles. This effectively stops the blood to the scrotum causing the scrotum and testicles to slough off in 3-4 weeks. It is best to use this method on calves prior to 2 weeks of age. In some European countries the law dictates that calves are castrated prior to 1 week of age. To increase the success rate of this method:

1. Maintain the elasticity of the bands by storing them in a sealed container in the refrigerator.
2. Restrain the calf either in a stall, or by laying it on its side.
3. Place the rubber band on the elastrator (*Figure 1*).



Figure 1

Squeeze the elastrator handle to spread the bands while cupping your other hand over the band to protect your eyes should the band break. Wearing safety glasses is an excellent practice. Make sure both testicles are in the scrotum when the elastrator band is applied (*Figure 2*).

5. After the elastrator is removed, check to make sure both testicles are below the band. If not, remove the band and repeat the procedure.
6. Calves with bands may be susceptible to tetanus. Consider giving the calf a tetanus antitoxin shot at the time of banding if there has been a problem with tetanus on the farm.



Figure 2

A relatively new practice in the beef cattle industry is the use of banders. Similar in principle to the elastrator, a heavy rubber loop is tightened around the neck of the scrotum and secured with a metal clip. The scrotum shrivels and falls off in two to three weeks. Bulls are banded when they start to show signs of masculinity (between 700 and 800 lbs. in beef bulls) and implanted with a growth promotant. Bulls up to 1200 lbs. have been successfully castrated with this method. Proponents of banding claim increased rate of gain and heavier carcasses because of the testosterone produced by the testicles and stress to the animal is minimal. In very large bulls there can be quite a strong odor from the decaying scrotal tissue four or five days after applying the bands but the bulls continue to eat and grow.

Burdizzo® castration is usually done on calves weighing 200-600 lbs. The Burdizzo® comes in several different sizes. Fit the size to the size of the calf. To tell if your Burdizzo® is working properly, clamp it on a sheet of paper. It should crease the paper without cutting it.

Good animal restraint helps minimize time required for the procedure, stress on the calf and chance of injury to the person performing the task. Whether you use a chute or just push the head through a feeder, a proper tail hold will decrease the chance of injury from kicking. In *Figure 3*, notice the hand is held on the base of the tail, pulling up and forward.

Once the calf is restrained, palpate the testicles to make sure both are present and normal (no scrotal hernias). Work the testicles downward into the scrotum. Place your thumb and forefinger around half of the scrotum at the center septum (*Note Figures 4 & 5*). Move the spermatic cord to the outside edge of the scrotum. When you place the Burdizzo® over the cord, be sure the Burdizzo® doesn't cross over the



Figure 3

center septum. Crushing the center septum may interrupt the blood supply to the scrotum and cause the bottom of the scrotum to slough off.

Position the Burdizzo® as high as you can while still remaining on the scrotum. On younger calves, try to be at least 1 inch above the top of the testicle and on older calves, 2 inches above the top. Close the jaws of the Burdizzo®. Don't slam the jaws together! You should hear a popping sound when the cord snaps.

While the jaws are still closed, take the testicle and pull firmly downward and push forward to make sure the cord is broken. Leave the jaws closed for at least 10 seconds. This reduces swelling and stress on the calf. Lower the Burdizzo® 1/2 inch closer to the testicle and repeat the same procedure (Figure 6). Double pinching gives you greater confidence and assurance that the calf is castrated.

You might encounter two problems with this method. Several days after Burdizzo® castration, you may observe calves that are stiff legged and have very swollen scrotums. This causes stress and reduces gains. Another problem with Burdizzo® castration, especially for inexperienced or unskilled operators, is that the spermatic cord may not be completely severed so calves remain bulls. Following the procedures described above will help eliminate both problems.



Figure 4

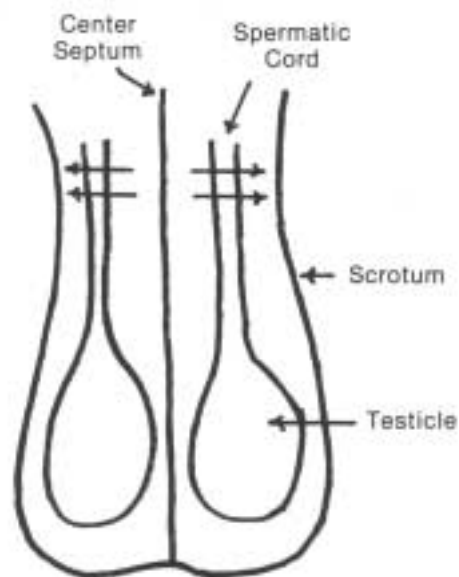


Figure 5



Figure 6

Implanting Dairy Steers

Feedlot operators have used growth promotant implants for years to improve rate of gain and feed efficiency. An average of 10-15% improvement in rate of gain and approximately 7% improvement in feed efficiency is realized by using implants. In addition, finished steers will have more muscle and less fat. A disadvantage may be lower marbling scores.

Optimal implant schedule is determined by diet, end slaughter weight and body type. Holstein steers that are on a high energy diet and are slaughtered at approximately 400 days should probably be implanted three times. The first implant would be at 200-300 lbs. with a lower potency implant listed in Table 1. A moderate potency implant is used at 500-600 lbs. A high potency implant is used 95 days prior to expected marketing weight. If dairy steers are on less than a 80% concentrate diet or are not fleshing well, a high potency implant should not be used, as these cattle will not finish well enough to grade.

Table 1. Relative Ranking of Implant Potency for Steers

Implant	Potency
Calf-oid	Lower
Implus-C	Lower
Ralgro	Lower
Synovex-C	Lower
Compudose	Moderate
Implus-S	Moderate
Steer-oid	Moderate
Synovex-S	Moderate
Finaplix-S + (Synovex or Implus or Ralgro)	Higher
Revalor-S	Higher

Good handling facilities make implanting quick and easy. Properly designed corrals with a head gate is a necessity. Larger steers may need an additional restraint such as a nose lead. An experienced person can implant an animal quickly with little animal stress or restraint.

The implantation site is under the skin in the middle 1/3 of the back of the ear (*Figure 1*). If part of the ear has been lost because of frostbite, the implant should be placed in the last third of the ear.



Figure 1

Implanting is a relatively simple procedure, which can be easily mastered following these steps:

1. Assemble the necessary equipment. Make sure the needle on the implant gun is clean and sharp. Have a few replacement needles on hand. Load the implants into the gun properly to prevent crushing of the pellets. Make any adjustments necessary so that the needle can be placed parallel to the ear as the needle is inserted under the skin. Have a disinfectant such as Nolvasan on hand at the right dilution rate.
2. Restrain the steer.
3. Sanitation is important to prevent a bacteria caused abscess from developing at the implant site. If the ear is clean and dry, the implant can be inserted. If the ear is wet it should be brushed with a disinfectant solution before implanting. If the ear is dirty, the dirt should be scraped off with a butter knife before the disinfectant is applied.
4. Pick up the implant gun with one hand and grasp the ear with the other. Place the point of the needle at the implant entrance site. This should be between the cartilage ridges and away from major blood vessels. The needle should be nearly parallel to the ear with the beveled side facing away from the ear (*Figure 2*). Lift the skin slightly and insert the needle under the skin. If you feel resistance, it may be because the needle is at too steep an angle and you are gouging the cartilage of the ear. It may help to rotate the needle so that the point is up towards the skin. If the needle is properly placed, it should slide relatively easily under the skin and you should be able to see the outline of the needle.



Figure 2

5. After the needle is fully inserted, withdraw the needle about 1/2 inch and begin depressing the plunger as you slowly withdraw the needle (*Figure 3*). Physically palpate the implant site to determine that the pellets are deposited in a straight line with the last pellet 1/2 inch from the opening that the needle made. The needle hole should be closed by pressing down on the hole. Rather than pellets, Compudose® is a silicone implant that is impregnated with a growth promotant. Because of its larger size, it can be a bit more difficult to get the needle properly positioned (*Figure 4*). But with a little experience, the successful implantation rate can be as high for Compudose® as the other implants.



Figure 3



Figure 4

6. The needle should be cleaned between animals with a diluted disinfectant. One ounce of chlorhexidine, the blue disinfectant, per gallon of water works well. Alcohol does not. The cleaned implanting needle can be dipped in an approved, non-irritating antibiotic between animals as added insurance. Keep replaced needles on hand in case the needle in use becomes dull or damaged. Dull needles can be resharpened on a whetstone. Make sure there are no burrs on the inside of the needles.

7. If steers are re-implanted later, it is a good idea to use the opposite ear. For example, implant all calves in the left ear, next time use the right ear. If Finaplix and another implant is used, put one implant in each ear.

Implanting is a relatively simple operation and can be mastered with a little experience. Errors that will decrease effectiveness include:

1. Depositing the implant into the cartilage will cause absorption to be too slow.
2. Dirty needles can cause abscesses or infections, which walls off the pellets and prevents absorption.
3. Severing a blood vessel in the ear may cause absorption of the implant to be too quick.
4. Failure to withdraw the needle as the pellets are deposited may cause them to be crushed. Absorption will be too quick and may cause the animal to act as a bull.

By getting steers on implants from 200 lbs. to market, you can realize savings of about \$40 per head or more. With practice, implanting is easy and takes only a few seconds. Follow manufacturer's recommendations for proper implantation and withdrawal times.

Dehorning Calves and Older Animals

Unfortunately, dehorning calves tends to be one of those jobs that gets put off until animals are much older and larger than need be. Dehorning animals at an older age is more dangerous, requires more labor, and greatly increases the level of pain and stress on the animal. In fact, many European countries have passed laws encouraging dehorning at a young age because it is more humane.

The preferred method of dehorning will depend somewhat upon the size of the calf. When dehorning young calves, it is only necessary to destroy or remove the keratin producing cells of the horn bud. Left intact, these cells produce the outer casing of the horn. Skull bone then grows to occupy the center of the horn. Caustic chemical, tube dehorner, or an electric dehorner can be used to prevent the horn from developing. Tube and electric dehorner can generally be used up to about four months of age. Barnes-type dehorner, dehorning clippers and saws are used to remove horns from more mature animals.

Caustic Stick or Paste

Caustic stick or paste is best used on calves less than 2 weeks old. First clip the hair around the base of the horn bud as close as possible. Next clip, scrape with a knife, or file off the end of the horn button or rough tissue over the horn bud. This allows the dehorning chemical to easily penetrate the tissues that produce the horn. Apply a ring of petroleum jelly or Vaseline around the base of the horn to prevent any excess chemical from running into the eye or onto unprotected skin. The Vaseline ring is not necessary if the dehorning chemical is lacquer based.

Apply the caustic stick or paste according to the directions on the label. Cover an area about the size of a nickel (*Figure 1*). If housed in group pens, restrain calves for a few hours to prevent them from rubbing the chemical off on each other, which may cause burns or scars. A scab should form in 6-8 hours. Excellent results have been obtained using this method of dehorning, but for some dairymen, results have been variable and disappointing.

Tube Dehorning

Using a dehorning tube on calves 1 to 4 weeks of age is one of the easiest and safest ways of dehorning. Restrain the calf in a head gate, or more simply lay it on its side on the ground. If inexperienced, you may have difficulty locating the horn bud on young calves. Clipping the hair over the bud will make it more easily visible. With additional experience, clipping the hair will not be necessary.



Figure 1

Tube dehorner come in a set of four different sizes (*Figure 2*). Select the correctly sized tube so that about 1/8 inch of skin around the bud will be removed. Place the tube over the bud (*Figure 3*). Twist with moderate pressure to cut through the skin. When you are through the skin to the bone, slant the dehorner at a 45 degree angle with the tube's handle toward the calf's muzzle. Applying pressure and twisting, scoop out the horn bud. Occasionally, the bud may still be attached by a strip of skin. Have a sharp knife handy to cut through this skin to complete the removal of the horn bud (*Figure 4*).

Sprinkling astringent powder on the wound will help minimize bleeding. If calves are dehorned prior to 4 weeks of age, there is usually very little bleeding and blood vessels may not have to be pulled. However, it is a good practice to check for exposed arteries and pull them to minimize blood loss. When using the large tube dehorner on older calves, the angle of cut is such that it can be difficult to locate and pull the artery. In that case, it is better to use a gouge or

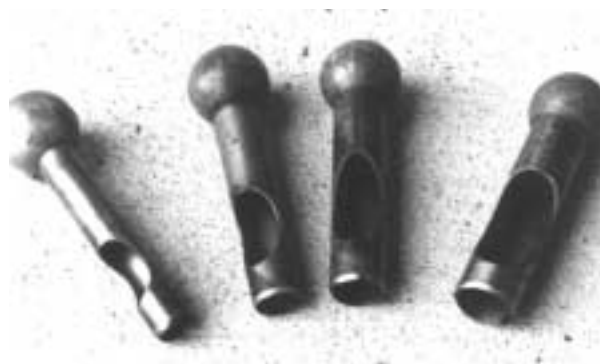


Figure 2



Figure 3



Figure 4

Barnes dehorner, which will expose the blood vessels for easier removal. Observe calves for a few hours and if excessive bleeding is noted, pull the blood vessel.

Apply a fly repellent dressing if dehorning is done during the fly season. Observe the calves for a few weeks and if a maggot infestation is noted, clean the wound and apply a fly repellent wound dressing.

Electric Dehorning

Electric dehorning of calves has gained popularity, particularly for use during the summer. Because it is bloodless, it

eliminates the worry of fly problems. Calves can be dehorned from 1 week to 4 months of age with this method.

There are a couple of disadvantages to electric dehorning. Smoke and odor during the procedure can be offensive. Incomplete dehorning can result in horn tissue that regenerates into scurs.

Here are a few suggestions to help eliminate some of the odor problems:

1. Use the electric dehorner in a well ventilated area.
2. Clip the hair around the horn buttons to help eliminate smoke from burning hair.
3. Dehorn calves at a young age, and use the electric iron appropriate for the size of horn buttons. *Figure 5* shows two common electric dehorner tips. The amount of smoke and odor from the dehorner with the small tip is negligible compared with using the larger tip and the wound is much smaller.



Figure 5

Proper dehorning will eliminate scur growth. If scur growth occurs, the heat from the dehorner did not penetrate deep enough to destroy the blood supply to the horn tissue. You can avoid this by using the appearance of the horn button as a guide for when the procedure is finished, rather than just using a certain number of seconds as the stopping point. Amount of time required will be influenced by temperature of the dehorner, amount of force applied to the dehorner and the fit of the dehorner tip over the horn button.

A copper ring around the horn is generally used as an indicator that the dehorning is complete. However, if the dehorner is applied without enough force, this copper ring can appear without enough heat penetration to destroy the underlying blood supply to the horn button and horn or scur growth will occur. Some people prefer to apply the dehorner just a bit longer until it penetrates through the skin to the skull. Note the white ring inside the copper ring in *Figure 6*. In this case you can be sure that there will not be horn regrowth.

Following are pointers for effective dehorning:

1. Restrain the calf so its head is immobile. The calf's head can be pulled through a feedbunk or stanchion and the head tied with halter or nose lead to the opposite side being dehorned. Another method of restraint is to lie the calf on its side and put your knee on the neck. Be careful of the feet and legs with this method. It may be advisable to have someone help hold the calf still.



Figure 6

2. Plug the electric dehorner in 10-15 minutes before dehorning, so the iron can preheat. The iron is hot enough as soon as it can char a piece of straw or paper.
3. With your free hand, grasp the ear of the calf on the side to be dehorned. Place the dehorner around the button with good pressure. Twist the dehorner clockwise and counter clockwise slowly to help distribute the heat evenly (Figure 7).



Figure 7

4. The dehorner has to be left on the button for approximately 5-20 seconds. The time will seem longer, because of the combined unpleasantness of burning hair and a struggling calf. If the horn button doesn't show a good copper ring, or separation between the hide and button, if that is desired, apply the dehorner again for another 5-10 seconds. Keep checking the button until a good copper ring surrounds the button. Another indicator that dehorning may be complete is when you hear a squeaking sound as the dehorner is twisted. It is the sound of the dehorner tip rubbing against the bone of the skull. Figure 8 shows where the dehorner penetrated through the hide to the calf's skull and the horn button removed. This will not generally cause a problem. The calf will not be unduly injured if the dehorner is inadvertently applied a little longer than necessary. The skull is fairly thick in young calves at this location and underneath is the sinus cavity space.



Figure 8

5. After dehorning, a scab will form in the area. Scab and horn bud will fall off in 4-6 weeks. Even though this is a bloodless form of dehorning, if the calf disturbs the scab, a small amount of bleeding may occur which could attract flies in the summer months. While this is seldom a problem, calves should be observed and if a maggot infestation is noted, the wound should be cleaned and a fly repellent wound dressing applied.
6. Always use an iron free of charred material. Use a wire brush or scraper to clean the dehorner top as you work. Charred material acts as an insulator between the hot tip and the horn button.
7. The younger that the calf is when electrically dehorned, the less stress it is on the calf and the person performing the operation. A dehorner with a small tip should be used on the younger calves. The dehorner with the larger tip should only be used on older calves whose horn buttons are already too large for the smaller dehorner.

- Use a heavier extension cord than the 18 gauge cords most commonly sold to assure ample voltage at the dehorner. If the cord is less than 50 feet long, a 16 gauge cord is recommended. If longer, go with 14 gauge. If too light or excessively long cords are used, resulting voltage drop will cause the dehorner's heating elements to heat to a lower temperature and may cause them to fail prematurely.

With more calves being raised in calf hutches without a convenient electricity source nearby, battery operated, butane fueled or propane fueled dehorner are becoming increasingly popular (*Figure 9*). They are more expensive to purchase, but are very convenient and work well.



Figure 9

Barnes-type Dehorner, Clippers, Saws

Barnes-type dehorner, clippers, and saws may be used on cattle varying in age from 2 months to maturity. Use caution when dehorning larger cattle. The exposed sinus cavity and blood after dehorning attract flies during the fly season. During cold weather, the exposed sinuses can lead to respiratory problems. Therefore, it is generally best not to dehorn large animals during summer or winter months.

Barnes-type dehorner can be used on calves from 6 weeks to 12 months of age.

- Assemble equipment needed: Barnes dehorner, disinfectant to sanitize dehorner between calves, forceps or pliers, roll of cotton and styptic powder (blood clotting powder).
- Restrain the animal properly. A chute with a head table is preferred. Haltering the calf and securing its head through a fenceline feeder is also an adequate method of restraint.
- Place the Barnes dehorner over the horn or horn button. The knives of the dehorner should be placed so 1/4 inch of skin is taken all the way around the horn button. Proper placement is critical in calves with larger horns because of the oblong shape of the horn. *Figure 10* shows placement that will facilitate proper dehorning.

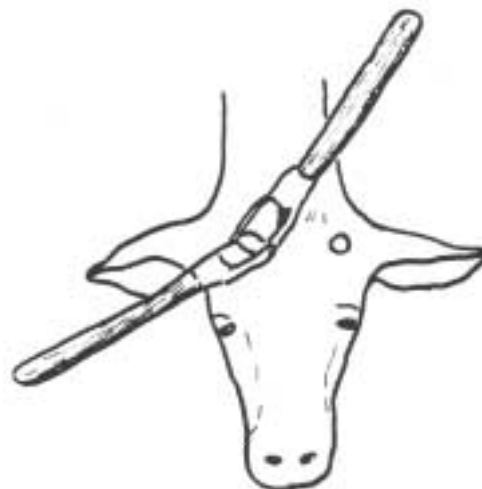


Figure 10

- Spread the handles apart quickly with inward and downward pressure, twist, and lift up. A complete ring of hair should be removed with the horn (*Figure 11*). If all the horny tissue is not removed, a second or third cut may be necessary to prevent scurs. Proper positioning of the dehorner the first time will make this unnecessary.



Figure 11

- Stop excessive bleeding by cauterizing or pulling the exposed arteries. The major arteries will be located at the bottom of the wound between the base of the ear and the eye. In older animals, an artery may also be fairly well developed opposite the major ones at the top of the wound. Forceps, hemostats, needle-nosed or regular pliers can be used to pull arteries. Actually most people are more efficient at pulling arteries using an ordinary set of slip joint pliers found on most farms because they have a wider gripping surface. The broken artery will retract into soft tissue and bleeding should stop. Pulling arteries will not cause internal bleeding (*Figure 12*).



Figure 12

The arteries can also be cauterized using a hot iron. A soldering tip directed at the bleeding source works well. Avoid using a large electric dehorner for this purpose, as it will result in more destruction of tissue than necessary and may not penetrate deep enough to stop the bleeding.

A blood clotting powder can be applied if the sinus cavity is not exposed. If it is, as in *Figure 13*, cover the sinus with a thin layer of cotton after the main arteries have been pulled. This will help facilitate clotting and prevent entry of foreign matter into the sinus. The brain sinus should swell shut in 3-4 days. Calves should be observed periodically for 24 hours to spot excessive bleeders. Calves that continue to bleed need to be restrained and the artery cauterized or pulled.



Figure 13

As calves become older, the amount of bleeding, stress on the calf, and labor requirements become greater. Cattle more than 1 year of age may be too large for the Barnes dehorner. They will have to be dehorned with a dehorning clipper or a saw. Saws need to be used on mature animals, rather than clippers, to prevent the possibility of cracking the bone that forms the horn core. You want at least 1/4 inch of skin or ring of hair all the way around the horn. Don't start at too deep of an angle when using a hand saw. Pull the arteries.

Anesthetic During Dehorning

With increased concern for animal welfare, there is increased interest in reducing pain to the calf. In fact, in some countries calves must be given an anesthetic prior to being dehorned. The nerve for the horn area extends from near the eye and runs under a small ledge of the skull to the horn. Using a 1/2 to 1 inch needle, the anesthetic is injected under this ridge (*Figure 14*). Anesthetic and dosage levels can be procured from your veterinarian. The anesthetic works almost immediately if deposited on the nerve. However, you should wait at least 5 minutes before dehorning. This is the time required for the anesthetic to diffuse through the tissue to the nerve if the injection was off by just a little. A vein and artery run along side the nerve and if the anesthetic is inadvertently injected directly into the blood stream it can cause the animal to temporarily go down. This is usually not a problem, but it is sometimes recommended to withdraw the plunger of the syringe slightly before depositing the anesthetic. If blood flows into the syringe the needle is in a blood vessel. Reposition the needle before making the deposit.



Figure 14

An alternate protocol was recently reported by researchers to minimize pain related behaviors in 4-8 week old calves dehorned with an electric dehorner. Calves received a non-steroidal, anti-inflammatory drug (ketoprofen) before dehorning as well as 2 and 7 hours afterward. Calves received a sedative (xylazine) and local anesthetic (lidocaine) a few minutes before dehorning. Consult your veterinarian if you wish to adapt these procedures for your farm.

Taking an Animals Temperature

One of the first signs of an infection is that an animal will have an elevated temperature. For that reason, a temperature should be taken for any animal that appears to be under the weather. It has become a common practice on many dairies to take daily temperatures for five days after calving.

A bulb type thermometer or digital thermometer can be used to take the temperature. A bulb thermometer needs to be shaken down below 96° F before use. The thermometer or probe should be lubricated prior to insertion. Most people use their own saliva as a lubricant but Vaseline or other suitable lubricant can be used. A bulb thermometer should be left in the rectum for 2-3 minutes. It is a good idea to have a string attached to the hole in the top of the thermometer (*Figure 1*). After the allotted time, remove the thermometer, wipe it clean, and read the temperature.



Figure 1

Digital thermometers have the advantage in that they are much faster. The temperature can be read as soon as the readout stops fluctuating (*Figure 2*).



Figure 2

Following are normal ranges for temperature, heart and respiration rates for animals at rest:

	Temperature	Heart Rate	Respiratory Rate
Newborn	101.4-104	130	56
1 month old	101.4-103.5	105	50
3 month old	101.4-103.5	99	40
6 month old	101-103.5	96	30
1 year old	99.5-103.5	80	18
Cows	99-103	80	14

Heart rates can be felt in the artery on the underside of the tail, the artery inside the hind leg, the chest of a calf, or heard with a stethoscope on the chest of a cow.

Tips on Giving Injections

A variety of injections of antibiotics, vitamins, hormones, vaccines, or dewormers are given on dairy farms. Using proper techniques will reduce frustration and improve performance of products being injected.

Keep several lengths and gauges of needles on hand. The gauge number and needle diameter are inversely related. For example, a 20-ga. needle is smaller than an 18-ga. needle. A dairy should have 16, 18, and 20-ga. needles on hand ranging in length from 3/4 to 2 inches. Always use the smallest needle available that will do the job to minimize tissue damage and leakage. Generally, for intramuscular injections use a 16 or 18 gauge needle, 1 to 2 inches long. Subcutaneous injections should be given with a 1/2 inch, 16 gauge needle. A 16 gauge, 2 inch needle is used for IV injections. Proportionately smaller needles can be used for calves. Syringes and needles are best sterilized by boiling in water for 10 minutes. At a minimum, syringes and needles should be cleaned with soap and water, rinsed thoroughly with water and allowed to air dry. Disposable syringes and needles are a cheap and viable option.

Most injectables need shaking before use. After shaking, inject the same amount of air into the bottle as the amount of liquid you wish to withdraw. This prevents a vacuum from forming as the liquid is withdrawn (*Figure 1*). If the liquid is thick, a 3/4 inch, 18 or 16-ga. needle will give a faster fill. After filling, tap the barrel of the syringe to send air bubbles to the top and expel the bubbles.



Figure 1

Be sure to read the label for type of injection. An improper injection can cause the solution to be less effective, increase withdrawal times, or cause injury to the animal. In addition, to lessen risk of infection, the injection site should be clean and dry. Applying disinfectant (alcohol) to the injection site is probably not worthwhile.

Intramuscular

The most common injection is intramuscular (IM). Antibiotics, for example, are mostly given IM. The three most desirable IM injection locations (*Figure 2*) are the thigh, thick part of the neck muscle, or rump (flat region between the hooks and pins).

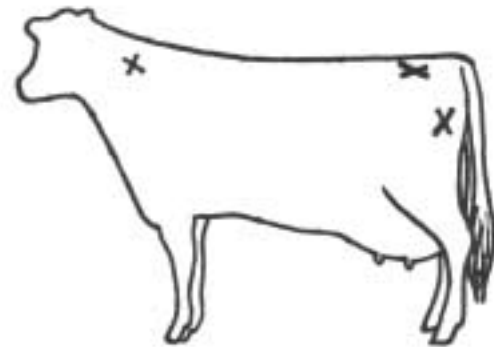


Figure 2

The rump is generally the easiest to inject, but has poor circulation causing slower absorption. For calves, use an 18-20 ga. needle, 1 inch long. Use a 16-18 ga., 1 1/2 inch needle on older animals for quicker delivery of the product deep into the muscle.

Once the injection site is chosen and the animal is properly restrained, use these tricks to help place the needle IM. Pinch or pull the skin a couple of inches from the intended injection site (*Figure 3*) or firmly slap the area 2-3 times to distract the animal. With a quick thrust, plant the needle almost straight in. With the needle and syringe properly placed, draw back the plunger (*Figure 4*). If blood appears in the syringe, the needle may be in a blood vessel and it should be withdrawn slightly before injection. If the solution goes directly into the blood, it may go to the brain and temporarily affect motor function. Do not exceed much more than 15 cc of fluid at one injection site in the adult animal. Smaller amounts should be used in the immature calves, down to 5 cc in the small calf. More than this can cause some muscle necrosis and stiffness. After a large dose is injected, it is a good idea to massage the area to help disperse the drug.

Subcutaneous

The subcutaneous (Sub-Q or SC) injection is made directly under the skin for slower absorption. Vaccines are usually given this route. A 1/2 inch, 16-gauge needle can be used if a small dosage is given.



Figure 3



Figure 4

Give subcutaneous injections in the neck near the shoulder, where a large lymph node bed nearby will help in absorption. *Figure 5* shows grabbing a fold of skin and thrusting the needle into the open cavity left by the fold of skin. Again, check for blood. If none, deposit the solution. The maximum SC injection is 20-30 cc in the adult and down to 7-10 cc in a calf. Massage the area briefly to reduce swelling.

Intravenous

When large volumes of solution are given (such as Calcium Dextrose or CMPK for milk fever) an intravenous (IV) injection is used where injection is made directly into the jugular vein. The jugular veins carry blood from the head to the heart and runs from the back of the jaw to the shoulder.

To make an intravenous injection the animal is generally restrained by a noselead with its head tied to the side. To assist with finding the vein, a rope or rubber tourniquet is usually placed on the neck below the proposed injection site. Finger or thumb pressure by you or an assistant against the vein may be used instead of a tourniquet. With proper pressure the vein becomes prominent, making insertion of the needle easier.



Figure 5

Hold the needle parallel to the vein with the beveled opening facing toward you as you push the needle through the skin (*Figure 6*). After it is through the skin, hold the needle a little more perpendicular to the neck as you push it through the wall of the vein. Once to the middle of the vein, lower the needle back parallel to the vein, then insert it the rest of the way being careful to keep it in the center of the vein.



Figure 6

Blood should flow from the inserted needle. If not, try pulling the needle out slightly, rotate a quarter turn and push back in. This procedure may get the beveled end more in the center of the vein.

Once the needle is properly positioned, the tourniquet or hand pressure on the lower vein is removed. At this point the blood can flow back to the heart and no or very little blood will be squirting from the needle. If blood continues to squirt from the needle at a high rate, it may be in the carotid artery which flows from the heart to the brain rather than in the jugular vein. Do not make injections into this artery. If in doubt, remove the needle and begin the procedure over. The carotid artery is deeper in the neck than the jugular vein and it is unlikely that you will hit it but it has happened.

When attaching the rubber tube or syringe to the needle, let a few drops of solution drip out to make sure that no air bubbles get into the vein. After attaching the tube or syringe, release the tourniquet or thumb pressure. Allow the solution to flow into the vein at a slow rate (use the manufacturer's rate of flow as a maximum). The rate of flow is determined by how high the bottle is held if a tube is being used. It should take 10-20 minutes to administer 300 ml.

If the flow rate is too fast, the animal may go into cardiac arrest. At the first signs of shortness of breath, rapid pulse or frothing from the mouth, discontinue the injection until the animal returns to normal. Then resume the injection at a slower flow rate.

If a second bottle is given, it should be administered at a slower rate than the first. If possible, monitor the heart with a stethoscope. If the heart beat becomes irregular, stop the IV immediately. If milk fever is being treated, it is not unusual for a cow to shake or shiver slightly or belch after treatment.

A low volume intravenous injection (<5 cc) can also be given in the tail vein. This vein can also be used to draw blood samples. Whether drawing a blood sample or giving an injection, the underside of the tail should be first cleaned with a disinfectant (*Figure 7*). The vein runs down the middle of the underside of the tail. You will want to insert the needle at an angle in a valley between the bony projections (*Figure 8*). After the needle is inserted into the vein, pull back on the plunger. The syringe will readily fill with blood if you are in the vein (*Figure 9*). If not, remove the needle and try again. Because the vein lies just next to the bone, you may contact the bone as you attempt to locate the vein. Withdraw the needle slightly if this happens.

Always consult your veterinarian for specific drug and treatment information. Always read the labels before administering any solutions. Check dosage, route of administration, and expiration dates. Keep drugs properly stored (most are refrigerated) and out of sunlight. Mix different solutions or give multiple injections only under the direction of a veterinarian. Many products are not compatible, and mixing them decreases effectiveness of each.



Figure 7



Figure 8



Figure 9

Minimizing Calf Scours

Calf scours is one of the most common diseases affecting young calves. It can be caused by infectious organisms, nutritional or environmental stresses. Most frequently, a multiple of factors are involved. The amount of effort needed to control scours will vary from farm to farm. Infectious causes of calf scours are presented in *Figure 1*. Traditionally, E. coli, coronavirus and rotavirus have been most commonly reported, but there has been an increase in reported severe outbreaks of cryptosporidia caused scours. As with most diseases, an ounce of prevention is worth a pound of cure.



Figure 2

<i>Infectious Cause of Scours</i>	
Bacterial Causes:	
Enterotoxigenic severe E. Coli (ETEC)	Most common cause of watery diarrhea with dehydration
Salmonella	Not common but outbreaks on individual farms can be severe
Viral Causes:	
Coronavirus and Rotavirus	Present in most herds. Often compounded by bacterial infections.
BVD Virus	Causes persistent diarrhea. Erosions on lips, tongue. IBR May cause listlessness, scours and death.
Protozoan Parasites:	
Cryptosporidium	Usually show signs of severe watery diarrhea, dehydration, anorexia and depression within 5 days up to 3 weeks of age.
Coccidiosis	Affects calves 3-4 weeks of age or older. Blood in feces.

Figure 1

Prevention

1. When weather permits, a clean grass lot is an ideal place for calves to be born. If a pen is used, it should be cleaned and disinfected between calvings (*Figure 2*).
2. Regardless of where the calf is born, a minimum of 2 quarts of colostrum should be fed within 30 minutes of birth. Feed from a bottle that was hand milked from the mother. Force-feed weak calves. Another 2 quarts can be

fed within 4-6 hours. Some herds have solved calf health problems by feeding a full gallon of colostrum as soon as possible after birth. The calves may drink the first 2 quarts, but need to be tubed the second 2 quarts. They are not force fed if not hungry for the second feeding 12 hours later, but usually regain their appetites for the feeding 24 hours later. Good colostrum will have a thick consistency and colostrum from 4-5 year old cows will have a 40% higher antibody content than that from 2 year olds. Keep frozen colostrum on hand from an older cow for those occasions when a cow may calve without adequate colostrum. An excellent method of freezing colostrum is to place 1 quart of colostrum in a 1-gallon zip-lock bag laid flat in the freezer. If the freezer is -5° F or below the colostrum should stay good for over a year. Colostrum can be thawed in warm water (<120° F) or in a microwave. The microwave should be set on low power for short periods and the thawed liquid poured out after each period to avoid overheating. Thawed colostrum should be at body temperature (101° F) when fed.

3. Calves should continue to receive colostrum for three days. The antibodies continue to provide immunity in the gut even though they are not absorbed intact into the bloodstream.
4. Milk replacers should contain less than .5% fiber and be made from milk by-products such as whey, dried skim milk and casein. It may be advantageous to stay on colostrum or whole milk in problem herds.
5. Clean calf-feeding utensils the same as milking equipment by using a warm rinse, hot detergent, acid rinse and allow to dry. Sanitize with 100 ppm chlorine before use.
6. Maintaining a closed herd may prevent introducing “hot bugs” to the dairy.
7. Isolate sick calves or feed and handle them last.



Figure 3

8. Provide a clean, dry, well-ventilated calf raising environment. Calf hutches prevent the transmission of infectious agents from calf to calf (Figure 3).
9. Consistently feed the correct amount of milk to each calf. A calf should receive 10 percent of its birth weight each day. A 90-pound calf gets 9 pounds per day or 4.5 pounds (2 quarts = 4.3 lbs.) in two equal feedings. A 70 lb. calf would receive about 1 3/4 quarts. Inconsistent or over-feeding can cause scours. On the other hand, some farmers have solved scour calf problems by gang feeding them twice as much milk with several nipples off one barrel.
10. If *E. coli* is the cause of a herd scours problem, vaccination of dry cows with a K-99 bearing *E. coli* bacterin will give protection to calves through the colostrum. Colostrum from the vaccinated cows should be fed for at least 3 days and preferably longer.
11. Vaccines against rotavirus-coronavirus are available. The cow may be vaccinated prior to calving to provide antibodies in the colostrum. If an oral vaccine is used on newborn calves it must be given prior to the colostrum. If scours from rota or corona viruses are still occurring, colostrum supplements (such as Lifeline or Gammulin) may solve the problem by feeding 1 ounce per feeding for the 1st few days and then dropping to one half ounce per feeding until the danger of scours has past.

Treatment

Calves should be checked twice daily for scours. The treatment course to take is influenced by past experiences in the herd. Mild cases may not need treatment or may benefit from administration of an electrolyte solution after milk feeding. Signs of dehydration (sunken eyes, loss of skin elasticity - skin does not spring back after pinching between two fingers) and profuse diarrhea requires a more aggressive treatment.

Scours causes death in calves by dehydration, loss of electrolytes and/or lack of nutrient absorption. Treatment needs to address these three areas while allowing the calves' immune systems time to fight off the infectious agents causing the scours.

1. Continue feeding the calf the same amount of milk as usual. It is beneficial to divide the daily milk intake into 3 or 4 feedings. If fed 4 times per day, a 90 lb. calf would get 1 quart per feeding or 1 1/3 quarts if fed three times per day.
2. Feed an equal amount of a commercially available electrolyte solution as milk for the first two days of treatment, and then decrease the amount to 3 quarts on days 3 and 4 and 2 quarts on days 5 and 6. Less electrolytes may be fed for a shorter duration for mild cases of scours or as the severity of scours decreases.

Do not mix the electrolyte solutions with the milk. Electrolyte solutions may be either acidic or alkaline. If an acidic solution is used, the solution can be fed 15 minutes after the milk. Regarding alkaline solutions, optimally they should be fed at least 4 hours prior to milk feeding. Alkaline solutions raise the pH of the digestive tract for up to 4 hours, which can interfere with milk protein digestion and result in loose stools. If a commercial electrolyte solution is not available, an alkaline solution can be mixed using ingredients in Figure 4.

3. If the calf does not voluntarily drink the milk or electrolyte solution, tube the calf with an esophageal feeder

Electrolyte Solution

Energy source:

50 cc 50% dextrose solution
(or 1/4 cup light Karo syrup)
(or 1/2 package pectin)
(do not use table sugar)

Electrolytes:

1/2 teaspoon low sodium (Lite®) salt
(use regular salt if not available)
1/2 tablespoon baking soda Add warm water to
make 2 quarts

Figure 4

or stomach tube (Figure 5). A severely dehydrated calf may need an intravenous administration of electrolytes.

4. Make sure fresh water is always available to the calf.



Figure 5

5. Dehydrated calves often suffer from hypothermia. Provide supplemental heat if needed.
6. There is disagreement regarding the benefits of antimicrobial drugs in treating calf scours.
 - a. Antimicrobials may help if the scours are caused by a bacterial agent that is susceptible to the drug being administered. Antibiotics do not kill viruses or protozoa.
 - b. If drugs are used for *E. coli* scours, they should be given orally. Injections are preferred for scours caused by *Salmonella*.
 - c. Misuse of drugs may cause or worsen scours.
 - d. Occasional loose feces is common in healthy calves. The practice of giving a few “scour pills” to every calf with loose feces perpetuates the idea that antibiotics are needed. The calves would have recovered on their own.

Attention to detail and cleanliness will solve most scour problems. Because of the wide range of causes, work with your veterinarian to fine tune a prevention and treatment program.

Treating Pinkeye

As warm weather approaches, we see an increase in pinkeye (Infectious Bovine Keratoconjunctivitis, or IBK). Bright sunlight, dust, wind, pollen and face flies irritate and increase the eyes' susceptibility to infection. Also, eartags placed too far out on the ear, so when the calf flicks its ear the tag nicks the eye, has been implicated in contributing to pinkeye. Pinkeye usually occurs in summer, but may occur any time during the year. Clip pastures, control flies, minimize dust and provide shade to help lessen chance of infection.

Even under the best management, outbreaks may occur. Young animals are generally more susceptible than older ones. Economic losses can be seen in decreased growth, actual damage to the eye, a possible drop in milk production and the cost of treating cattle.

Most pinkeye cases are caused by a bacterium called *Moraxella bovis*, which invades the eye after irritation. The bacteria produce a toxin, which erodes the eye coverings. Initial symptoms are a watering eye, blinking of the eye, or holding the eye closed (*Figure 1*). The animal may seek shade and stand with the affected eye away from the sun. The eye becomes red and swollen. As the disease progresses, a whitish, opaque spot appears in the center of the eye (*Figure 2*). In acute cases, this opaque spot enlarges, ruptures and results in blindness.



Figure 1



Figure 2

Start treatment as soon as pinkeye is diagnosed to minimize economic loss and prevent unnecessary suffering for the animal. To treat the animal, secure the head and examine the eye closely. With pinkeye there should be a white opaque spot in the middle of the eye. If the eye irritation is caused instead by a foreign object in the eye, the white opaque spot will be to the side of the cornea. If that is the case, you may be able to lift the eyelid and remove the foreign matter with a cotton swab. If the foreign object is deeply embedded it might have to be removed by a veterinarian using anesthetic and forceps or scalpel. IBR (red nose) also may cause a red and painful eye but usually both eyes are affected, there may not be a white opaque spot present and the discharge is more of a white, creamy pus rather than clear tears.

Many different antibodies and routes of administration have been attempted as treatments for pinkeye. The pinkeye infection usually clears after treatment but it also clears in most untreated animals, as the immune system will eventually eliminate it. Recent studies comparing different treatments conducted at the University of California at Davis yielded the following results:

1. The most effective treatment for pinkeye that they investigated was injecting 20 mg/kg (about 5 ml/100 lb) body weight of long acting oxytetracycline (LA-200) intramuscularly 2 to 3 days apart.
2. They found that the two injections of LA-200 plus feeding 2 gms daily of oxytetracycline for 10 days after the second injection reduced the incidence of pinkeye for the entire summer in herds with a high incidence of the disease.
3. Florfenicol (Nuflor) was injected intramuscularly at the rate of 3 ml/100 body weight two days apart and compared to a one dose SQ injection of 6 ml/100 lb body

weight. Both were effective in promoting faster healing than untreated animals.

4. Injecting Procaine penicillin G just beneath the thin layer of tissue on the surface of both eyeballs using a fine needle daily until healed was as effective in treating acute cases as the intramuscular injection of LA-200. It was not as effective in preventing recurrences or new cases of the disease as the LA-200 injection. Because of the difficulty of giving this type of injection, it does not seem like a feasible alternative to the LA-200 intramuscular injection.
5. Another treatment was to inject 1 ml procaine penicillin G with a fine needle under the tissue of the inner eyelid and depositing the liquid so a small “blip” appears under the inner eyelid tissue. The same procedure was tried with a mixture of 1 ml penicillin G and 1 ml dexamethasone. With or without dexamethasone, the injection of penicillin into the upper eyelid did not speed healing in these trials (A protocol claimed to be successful on some dairies is to inject a mixture of 3 ml procaine penicillin G and 3 ml dexamethasone with half given in the upper eyelid and half given in the lower eyelid).
6. Topical application of furazolidone spray daily for 3 days promoted recovery but was not as effective as the intramuscular injections of antibiotics.

Topical ointments that may be effective in speeding recovery include antibiotics such as oxytetracycline, gentamicin, terramycin and a neomycin-polymixin-B-bacitracin combination. These are generally applied 1 to 2 times a day up to several days. If convenient, applications up to 4 times per day may be more effective. Dairy producers have substituted the antibiotic preparation from a mastitis treatment tube if eye ointment was unavailable. To apply eye ointment, hold the tube almost parallel to the eye with your hand resting on the animals face. Move the tube backward across the eye as you make your deposit (*Figure 3*).



Figure 3

In addition to antibiotics, topical atropine can be applied 1 to 3 times daily to relieve pain and corticosteroids may be administered topically or injected into the underside of the eyelid to decrease corneal scarring. Do not inject corticosteroids into pregnant animals because it can cause abortion.

Applying an eye patch after treatment is advisable to prevent further irritation from sunlight, dust and wind, and prevent transmission to other animals. They probably have no effect on healing rate. Patches can be purchased or made from an old pair of blue jeans. When applying the patch with a bead of glue (example: Kamar adhesive), leave a 2 to 3-inch space without glue at the bottom for drainage (*Figure 4*). The patch should wear off in about 14 days and the eye should be healed. If not, repeat the patch after consulting with your veterinarian.



Figure 4

Other more exotic methods are being used to treat pinkeye. Some veterinarians sew the third eyelid closed with dissolvable suture instead of using a patch, to protect the eye after antibiotic therapy. Also, a contact lense with antibiotic on it, which attaches itself to the eye and upper eyelid, has been developed and shown to be quite effective. The contact dissolves after the antibiotic is worn out.

Several vaccines are available to help provide immunity against the bacteria, which causes pinkeye. They vary in effectiveness probably because there are many different strains of *Moraxella*. New vaccines are under development. Consult your veterinarian on vaccine use. Some cows can be carriers of the bacteria and never show symptoms of the disease, allowing it to spread to other animals by flies or direct animal-to-animal contact. Controlling flies by using insect tags and good sanitation will help prevent bacteria spread.

Some research has shown a benefit from good vitamin A nutrition in controlling pinkeye in confined cattle. Check your feed, and supplement vitamin A if the requirement is not met.

Treating Ringworm

Ringworm is a disease that commonly appears during winter months in animals housed indoors. It is caused by a fungus, *Trichophyton verrucosum*, that forms grayish, crusty or scabby ringlike lesions, hence the name ringworm. Although cattle of all ages may be affected, the disease is more prevalent in calves and yearlings. Although it causes minimal discomfort to the animal, ringworm is an unsightly disease that may lessen the value of affected animals, prevent them from being exhibited at shows and can be transmitted to humans.

Animals are exposed to the fungus by contact with infected equipment or animals. Lice are also thought to spread the disease. After exposure, the fungus grows down into the hair follicles, causing the hair to break off or fall out. Grayish plaques or crusts are seen 1 to 3 months after exposure (*Figure 1*). Ringworm is usually found around the eyes, ears, muzzle, and neck, but can also be located on other areas. Left untreated, the animal develops an immunity to the fungus and will eliminate it from their bodies, although some infections may be quite persistent. The fungus is killed by ultra-violet light and high doses of vitamin A seem to help resistance and recovery. This explains why calves are usually cured spontaneously when turned out on pasture in the spring.



Figure 1

Many different treatments are used effectively to treat ringworm. Just the lesions may be treated, the entire body sprayed, or medication given systemically. Very few treatments have official FDA clearance for use on dairy heifers so consult your veterinarian before initiation of treatment. If there are just a few lesions to treat, first remove the crusts with a stiff brush and a mild soap and water (*Figure 2*) or use a metal currycomb. Slight bleeding commonly occurs. Simply painting the lesions with iodine or other solutions

without first removing the crusts will give disappointing results, because the fungus is in the skin.



Figure 2

After the crust is removed, the most common remedy is to apply a tincture of iodine. Ringworm lesions need to be soaked thoroughly during each application (*Figure 3*). Prevent the solution from getting into the animal's eyes. The iodine may need to be applied daily or every other day until the ringworm is cured. Because ringworm is highly contagious to man, wear rubber gloves and scrub after working with infected cattle.



Figure 3

Other topical treatments that have proven effective are: equal parts tincture of iodine and glycerin, copper sulfate, 20% solution of sodium caprylate, ordinary household bleach, and even old tractor oil. Thiabendazole, although best known as a wormer, is a potent antifungal agent and is effective against ringworm when the paste is applied directly to the lesions. At the same time, a therapeutic deworming

dose may be given orally. A similar product is Dichlorophen, used at a concentration of 2% in ointment form or in alcoholic solutions. Dichlorophen will generally clear up ringworm after just a few dressings. Another antifungal agent, Captan, has been mixed with water to form a thick paste and applied to the lesions although it is not approved for use on food producing animals.

If the infection is widespread over the body, the entire body of the animal should be sprayed weekly using a high pressure sprayer to remove the crusts and apply the medication. The body should be thoroughly soaked and all animals in the group treated. Effective solutions are: Natamycin (an antibiotic), 2 to 5 percent lime-sulfur solution, an iodophor solution, .5 percent sodium hypochlorite (bleach) solution, or 3 percent Captan solution.

Systemic treatments are also effective. Research studies done many years ago showed an injection of 1 million I.U.'s of Vitamin A followed by a second injection two weeks later to be effective. More effective is 2 IV treatments one week apart consisting of 30 gm of sodium iodide in 250 ml of water. Oral administration of Griseofulvin is fast and effective but more expensive and not approved for food producing animals (*Figure 4*).



Figure 4

The fungus that causes ringworm is resilient and may survive up to 4 years in dry scales shed by the animal. Once the fungus is in the environment, it's difficult to prevent animals from being exposed to it. Thorough cleaning and disinfection with chlorine (Chlorox bleach) of walls, ceiling, floors, mangers and equipment may eliminate the fungus. A fungicide such as Captan may also be used.

Calves differ in susceptibility; some calves may have severe lesions while others in the same pen show no signs of the disease. Calves in poor condition are often the worst affected and maintaining a high standard of general health and nutrition will help to reduce the effects of ringworm. A Vitamin A injection or addition in the ration may improve the integrity of the skin so to resist infection.

The incidence and severity of ringworm can be kept to a minimum with good management. Treat infected animals. Provide clean, well-ventilated and well-lit pens for calves. Feed calves a properly balanced ration. Effective vaccines are available in many countries but have not been approved in the United States as of this publication. Unproven folk remedies include hanging Holly in the heifer shed out of reach of the calves and running billy goats with the calves.

Lice and Mange Infestations

Lice and mange have been common cattle pests for centuries in all parts of the world. Lice are more common than mange and can be classified as either sucking or biting. Biting lice feed on pieces of skin and hair particles, while the sucking lice actually suck blood from the host. Lice cause the animal to itch, which can lower feed consumption, efficiency, increase nervousness and lower milk production. Sucking lice may occasionally cause anemia and in extreme cases, death.

Diagnosis is not difficult, but many times lice remain unnoticed until they have already caused financial loss. The first indication may be cattle rubbing on feed bunks or fencelines (*Figure 1*). Heavy infestations may cause bare patches of skin to appear, as in *Figure 2*. If you part the hair and look closely in good light, you may confirm the diagnosis if you see lice on the skin or their eggs, called nits, stuck on the hair.



Figure 1



Figure 2

The three most common species of lice are:

- Long-nosed cattle louse (*Linognathus vituli*)
 - blood sucking
 - heads conical or pointed
 - retractable mouth tube for sucking blood
 - eggs are dark blue or blackish in color
 - location: dewlap, shoulders, neck, rump, flanks, topline, udder and under tail
- Little Blue Cattle Louse (*Solenopotes capillatus*)
 - blood sucking
 - stubby head, a smaller but fatter body
 - retractable mouth tube for sucking blood
 - eggs are pale yellowish that bend hair where attached
 - location: face, neck, around anus
- Cattle biting louse (*Bovicola bovis*)
 - most common of lice species on cattle
 - brown or reddish, broad heads with visible mandibles for chewing
 - very irritating for cattle
 - eggs are pale, translucent
 - location: neck, shoulders, back, rump, tail
- General:
 - life cycles: 3-4 weeks
 - live only on cattle
 - wingless, 1 to 2 mm long

Knowing the life cycle of lice helps in planning a control program. Cattle lice spend their entire life cycle as parasites on cattle. The nits are attached to the hair and hatch in about 7-8 days. The lice go through 3 nymph stages and reach adulthood in 15-21 days. They begin producing eggs 3 days later. Adults may live as long as 9-10 weeks. Lice usually die within hours if removed from the animal. Although they may live in warm straw for a couple of days, lice are usually spread by animal-to-animal contact.

Most problems with lice infestations are seen during winter and early spring. Longer hair coats are an ideal habitat. Also, cows are more likely to be confined during this time, unable to groom themselves and exposed to less sunlight.

Lice infestations can be controlled quite well with insecticides available on the market. If treatment is for the milking herd, make sure the product is approved for lactating cows.

Health

Always follow label recommendations for proper dosages, method of application and safety precautions. Generally, insecticide applications need to be repeated 2 weeks after the first treatment to kill recently hatched eggs, as insecticides do not affect the eggs. All animals within a group should be treated at the same time to prevent re-infestation of treated animals by untreated ones. If lice persists after 2 treatments, consult your veterinarian. He or she may recommend a more potent product.

If time permits, clip an 8 to 10-inch wide strip of hair down the topline to expose lice to a harsher environment before applying the insecticide (*Figure 3*). This should ensure more satisfactory results.

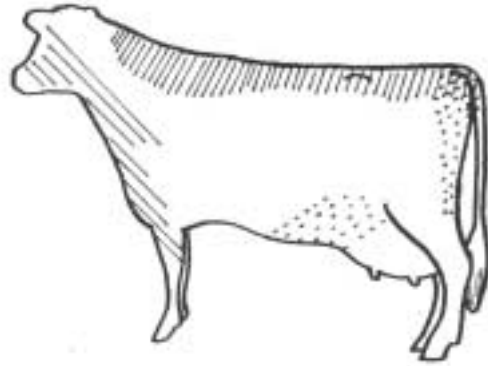


Figure 3

If lice have been a problem on your dairy, treat all cattle in late fall.

While an itching animal usually indicates lice, mange caused by mites may be the problem if lice or nits are not identified. Lice are usually found along the topline (*Figure 4*).

Chorioptic mange extends from around the tailhead down the inside of the hind legs to the belly. Sarcoptic mites prefer areas around the eyes, face, neck and brisket. Psoroptic mites generally prefer the topline. These are guidelines. Heavy infestations may cause lice or mites to extend over the whole body. Mites, depending on type, will live on the skin or burrow into the skin. Infested sites may have a crusted over appearance. Mites are identified by taking a skin scraping and checking for mites under a microscope.



- //// indicates preferred infestation sites for biting lice and Psoroptic mites.
- \\\\\\ indicates preferred sites for Sarcoptic mites.
- indicates preferred sites for Chorioptic mites.

Figure 4

Injectables that contain ivermectin or doramectin will control both lice and mites. Pour-ons that control both lice and mange have the active ingredient of phosmet, permethrin, moxidectin, doramectin, ivermectin, or eprinomectin. Fenthion and famphur are effective against lice but not mites.

Choke

Choke in cattle may be caused by cattle attempting to swallow a large, firm object such as an apple, potato, beet or green ear of corn. It is more likely to occur if objects are eaten from a raised trough or if an apple is eaten off a tree. Animals are more likely to chew food into smaller pieces before swallowing if eaten off the ground.

Bloat and salivation are two of the main symptoms of choke in cattle. Bloat is caused because excess gas is trapped in the rumen. Salivation or frothing at the mouth occurs because the cow can't swallow her saliva. The cow may stand with its head and neck extended. She may shake her head or move it up and down. Harsh coughing is frequent. If the obstruction is not complete so that saliva can still pass down and gas escape, the only symptoms may be the animal standing by itself, head stretch outward and mouth slightly open.

To further help with diagnosis, consider whether the cow had access to objects that may have gotten lodged in her throat. Next try to palpate the obstruction in the esophagus. *Figure 1* shows the most common location of an obstruction. Do not confuse the larynx (Adam's apple) with an obstruction. If the obstruction is felt, place your thumbs or fingers in the jugular furrow below the object on both sides of the neck. Gradually work the object upward by applying steady pressure (*Figure 2*). The muscles of the esophagus tend to contract and relax intermittently which should allow you to move the object upward. When the object is brought to the top of the throat, have another person reach into the mouth to pull it out while still applying upward pressure on the throat.



Figure 1

If massaging fails to dislodge the object, it may be best to leave the animal to recover on its own. If it is a high starch object, such as a potato, beet or apple, the amylase in the sali-



Figure 2

va will digest enough of it so that it will eventually slide down into the rumen or you can try massaging it up again after a few hours or even days. In the mean time, a trocar and cannula or large gauge needle may have to be used to puncture the rumen to alleviate any bloat that may occur. A less appealing alternative is to reach in with your hand to dislodge the object. Hold the nose with one hand and cup your hand to extend it down the throat (*Figure 3*). Follow the upward outline of the throat so that you are guided into the esophagus rather than the windpipe (*Figure 4*). This maneuver should really only be done with mouth gag or block in the animal's mouth so that you can't be bitten. The molar teeth can cut off or crush a finger quite easily. After locating the object, grasp it between your thumb and fingers and slowly pull it out. If the object cannot be grasped in order to withdraw it, it might work to bend a ten-foot wire in half forming a loop large enough to go over the obstruction. The loop is passed into the esophagus, over the obstruction and then slowly withdrawn.



Figure 3



Figure 4



Figure 5

Only as an absolute last resort to save the life of an animal should a stomach tube or hose be used to attempt to push the object down the throat and into the rumen (*Figure 5*). Using this procedure may damage the esophagus or other organs or cause the object to get lodged further down the throat.

If drooling is the only symptom noted, rabies may be the cause. Do not expose yourself to the rabies virus by needlessly putting your hand into the animal's mouth. Frothing or drooling at the mouth is the only symptom that rabies and choke have in common. Bronchitis or throat infections may cause symptoms somewhat similar to choke.

If bloat is extreme and the cow is in immediate danger of dying or is unmanageable because of the discomfort, the bloat may have to be taken care of first. Usually, the best way to treat bloat is to pass a stomach tube into the rumen, relieving the gas. Because the esophagus is obstructed, the preferred method to relieve bloat when caused by choke is to puncture the rumen with a 6-inch long 12 gauge needle. This is preferred over using a bloat trocar or knife because there is less chance of rumen fluid contaminating the abdomen. Obviously, you have to use what you have on hand at the time.

Choke can be prevented by keeping objects such as apples and potatoes away from cows. Feedstuffs should be chopped so that they are not the size or shape that might cause choke.

Treating Abscesses

An abscess is a pus-filled swelling on an animal's body (*Figure 1*). It is usually caused by a bacterial infection. Causes of abscesses include puncture wounds, giving injections with a contaminated needle or syringe, and open wounds from routine operations such as castration. Once bacteria gain entry, they multiply and pus forms. The body tries to encase the infection to keep it from spreading. Usually as the bacteria continued to multiply, a thin spot will develop in the hide and eventually burst.



Figure 1

Abscesses need to be differentiated from hernias and hematomas. Hernias occur in the abdomen wall where there is an opening in the muscle tissue allowing a loop of intestines to protrude through. The hole in the abdomen wall can usually be felt by palpation. The most common location for hernias is near the navel, many times caused by a navel infection. Small hernias usually resolve themselves as the calf grows since the hole in the body wall remains the same size while the intestines increase in size until they no longer fit through the wall. Larger hernias may need attention by a veterinarian to surgically repair the abdomen wall or a metal or plastic hernia clamp can be applied to the loose fold of skin, holding the intestines in. The clamp is tightened every few days. The clamp falls off along with the loose skin in two weeks. With very large hernias the animal may need to be culled.

Hematomas occur when a blood vessel near the surface ruptures, usually because of an injury. The swelling is filled with blood and it is usually best not to treat them as they usually heal themselves. Opening up a hematoma may cause excessive bleeding or initiate a bacterial infection.

To determine the status of an abscess, puncture it with a sterile needle on a syringe. Check to see if the point of the needle is in the hallowed core. Draw some of the contents into the syringe. If it contains pus it is an abscess and can be opened (*Figure 2*). If it contains blood, it is a hematoma and should be left alone. If it contains pus tinged with blood or is not distinctly hollow, it may be an abscess that is not yet "ripe." Opening an abscess too soon may cause bacteria to get into the blood and spread to other parts of the body or all of the pus may not be removed and a new abscess may form next to the old one. If in doubt, it is best to leave it alone or consult your veterinarian.



Figure 2

Before opening the abscess, wash the area with a disinfectant. If the hair coat is long, the hair should be clipped first. With a hooked or curved surgical blade, cut into the abscess near the bottom to allow better drainage (*Figure 3*). Gently squeeze the pus out of the abscess into a container. Because the pus may contain huge numbers of infective bacteria it should be disposed of properly.

After the initial incision, widen the cut by removing a triangular piece of hide near the bottom of the abscess to insure good drainage (*Figure 4*). A wide opening will also insure that the abscess heals from the inside without closing up on itself. If the drainage site closes before the infection is cured, the abscess may reoccur.



Figure 3



Figure 4



Figure 5

The abscess should now be wiped out with a piece of gauze soaked in disinfectant (*Figure 5*). Repeat the process a couple of times. An alternative is to irrigate the wound with cold water from a garden hose if the opening is large enough. Finally, irrigate the wound with mild disinfectant from a squeeze bottle. Irrigation can continue daily until healed although this is usually not necessary. Leave the wound opened, unbandaged for it to heal. If flies are a problem, use a wound dressing that includes a fly repellent. In nonlactating animals, an intramuscular injection of a broad spectrum antibiotic may help the wound heal and prevent spread of the bacteria to other parts of the body.

Timely drainage of abscesses will promote faster healing with minimum stress to the animal. The danger of the abscess bursting inward and infecting other parts of the body are lessened. In addition, the pus can be disposed of rather than contaminating the housing area as it would if allowed to burst and drain naturally.

Drugs and vaccines must be properly stored (Figure 3) because they can lose effectiveness if warmed or exposed to sunlight. Figure 4 illustrates effects of different temperatures on these products. At 32° F biologicals remain effective for a long time. Biologicals freeze at a few degrees below water and may become useless if frozen. Generally, 35-40° F is a safe temperature range. Storage of solutions as shown in Figure 5 occurs far too often. Buy your vaccines and antibiotics from a reputable source. Make sure they are kept at a proper storage temperature until you receive them to insure proper effectiveness.



Figure 5

Vaccines should not be mixed in the same syringe unless instructed. Use separate injection sites on the animal if different vaccines are being injected to prevent their mixing in the animal. A modified-live vaccine should be reconstituted just prior to use, kept cold, out of sunlight and used within two hours.

Advantages of modified live vaccines compared to killed virus vaccines are : there is less chance of an adverse reaction to the injection, they give a faster and stronger immune response, only one dose is required and they are less expensive. The advantages of a killed vaccine are that they are more stable in storage, safer to use on pregnant animals, no chance of reverting to virulent form, no mixing required and less likely to cause immunosuppression.

Avoid administering vaccines when animals are stressed. Do not vaccinate within 24 hours of trucking. Avoid vaccinating on hot days. On warm days vaccinate early in the morning. Don't vaccinate cows from 2 days before to 5 days after calving. Poor nutrition and parasites will suppress the immune response.



Figure 3

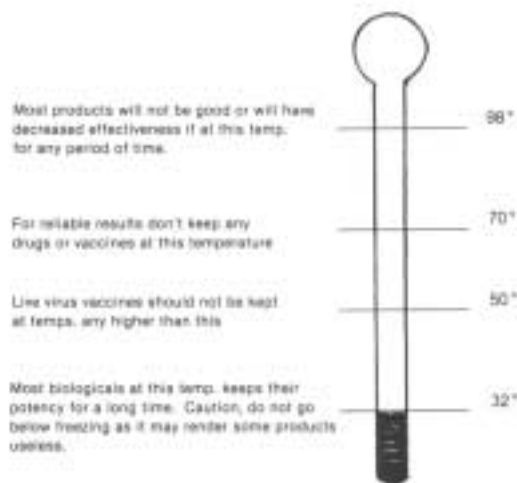


Figure 4

Always check the expiration date on the bottle and try to use the solution before that date (*Figure 6*). If stored properly, antibiotics will generally still be good for a short time past the expiration date. Consult your veterinarian if in doubt. If vaccines go beyond their expiration dates, discarding them is generally recommended.

When filling a syringe from a bottle, take care to avoid contaminating the remaining contents. Insert only clean needles through the bottle's rubber stopper. Once solution is removed, it should not be put back. Discard any unused solution in the syringe rather than risk contaminating the bottle's contents. Even under the best conditions, the shelf lives of partially used bottles of biologicals, especially live vaccines, are usually reduced. For this reason, buy injectables in small bottles that will be used quickly. Vaccinations should be set up so that the whole bottle is used on the same day.

Syringes and needles are best sterilized by boiling in water for 10 minutes (*Figure 7*). After boiling, allow them to dry thoroughly before storage. Be careful to avoid contamination before use. Store them in the original sterilized containers or plastic sandwich bags (*Figure 8*). Inspect needles and discard those that are bent or have burrs on the points. If boiling the instruments is not convenient, use disposable items or disinfect by filling the instrument with a 70% alcohol solution and squirting out the contents. Make sure all alcohol is forced out. A small amount of alcohol left in the syringe may decrease effectiveness of the biological and cause irritation to animal tissue. It is best to rinse with water a couple of times after using any disinfectant. After the instruments are cleaned, be careful to avoid contamination before use.

Finally, read the label and give proper doses based on the animal's weight. Too small a dose will probably be ineffective. Exceed label dosage recommendations only under directions from your veterinarian. Excessive dosages can injure or kill the patient and will increase withdrawal times.

Develop a complete vaccination program as part of a complete herd health program which includes sanitation, parasite and fly control, balanced rations and animal comfort.



Figure 6



Figure 7

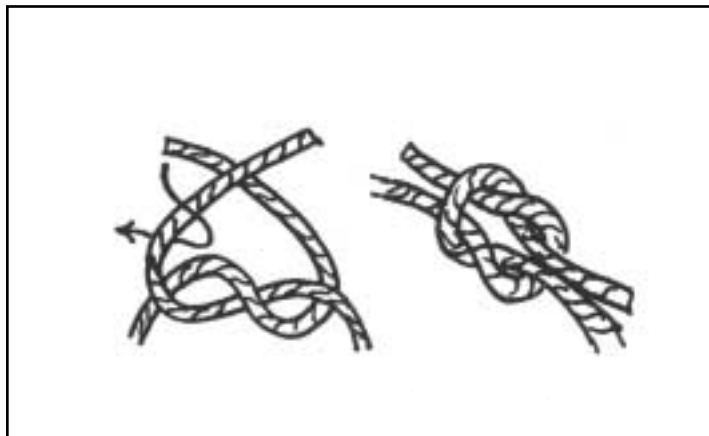
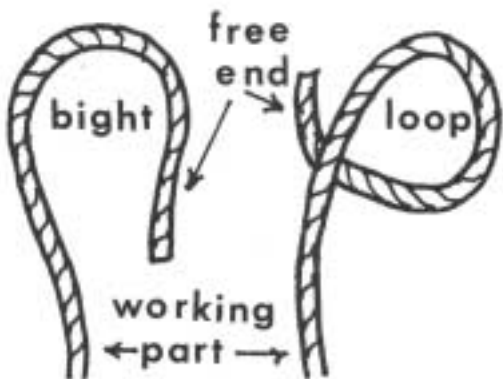


Figure 8

Tying Farm Knots

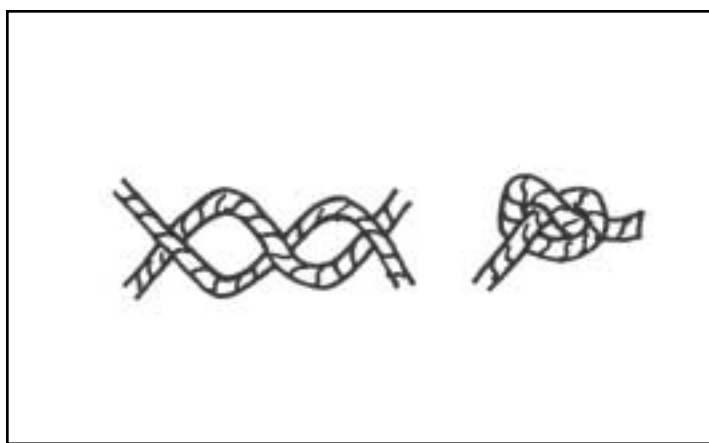
A rope is one of the most common of tools used to restrain animals. Unfortunately, most people never learn which knots are most efficient to use in given situations. Practice tying the knots presented here as you read through the descriptions.

First, let's define the parts of the rope:



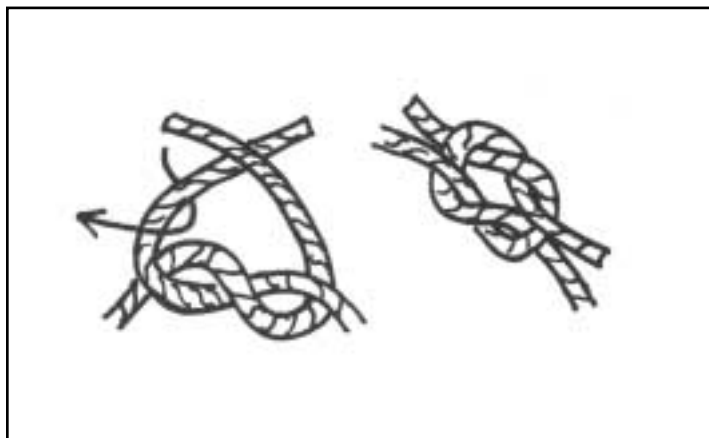
Square Knot

The square knot is simply two overhand knots tied one after the other. The sequence must be correct. Remember: right over left then left over right as you tie the overhand knots. Or the opposite: left over right then right over left. The knot should have a "square" appearance. The square knot is a strong, small knot used to tie the ends of two ropes together. When splicing two balls of twine together in a baler, a square knot is used. Under tension, a square knot will tighten and may be difficult to untie.



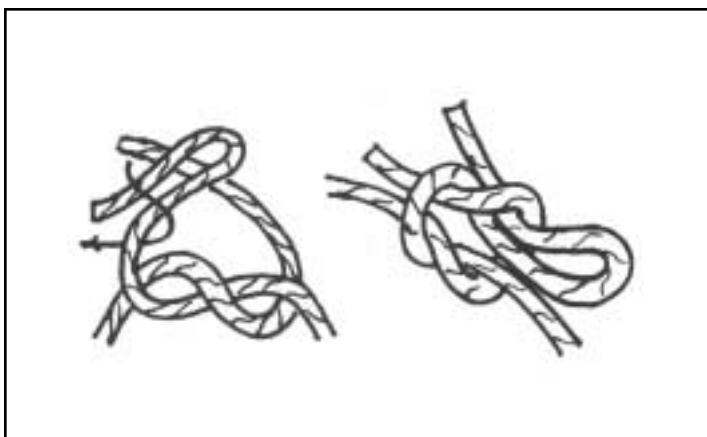
Overhand Knot

An overhand knot is the simplest of all knots. Generally, it is not used by itself but is the first step in tying more complex knots. It may be used by itself to keep the end of the rope from unraveling or to provide a knob or hand hold in a rope.



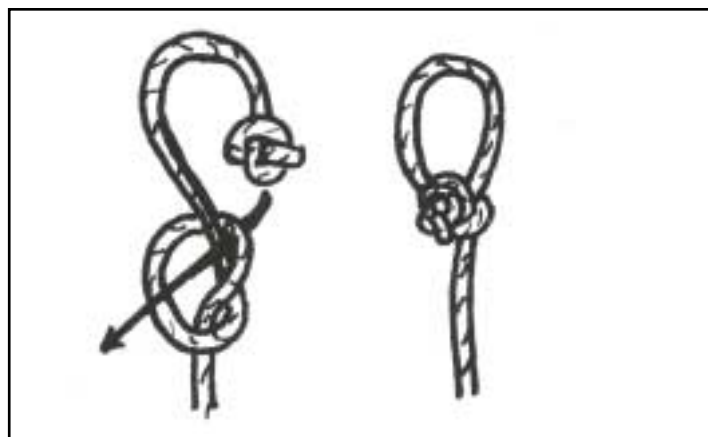
Granny Knot

The granny knot is an undesirable knot that is illustrated here so that you recognize it. It has no useful purpose. People mistakenly tie it when what they really want is a square knot. It is two overhand knots like the square knot but is bigger and not as strong. It is tied by going left or right and then left over right again, or by beginning right over left and going right over left with the second overhand knot.



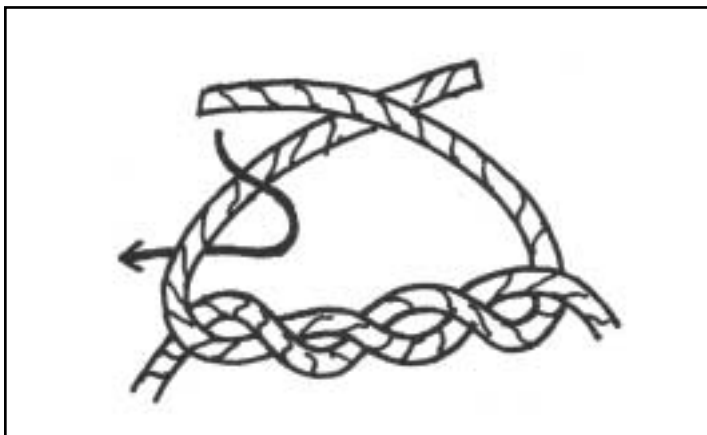
Reefer's Knot

The reefer's knot is just a square knot with a single bow in it so that it can be untied. A common use might be to tie a gate open or closed. Another closely related knot is the bow knot which is used to tie shoe laces.



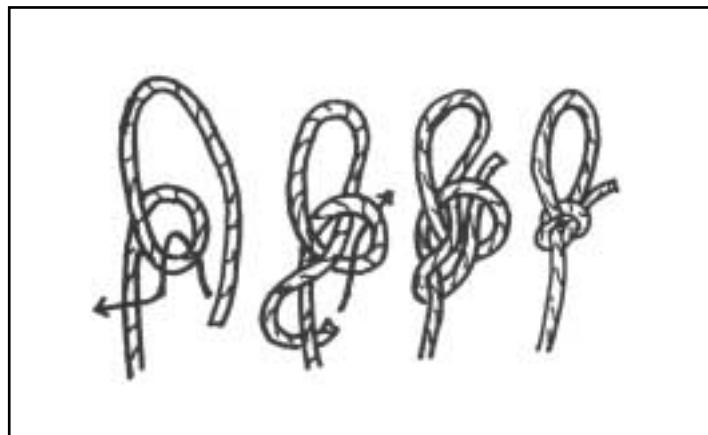
Honda Knot

The honda knot is simply one overhand knot inserted into another. Like the bowline knot, it will give a nonslip loop. It is used to form the small loop for the end of a lariat to pass through and because of its nonslip property may be used to tie a rope around an animal's neck.



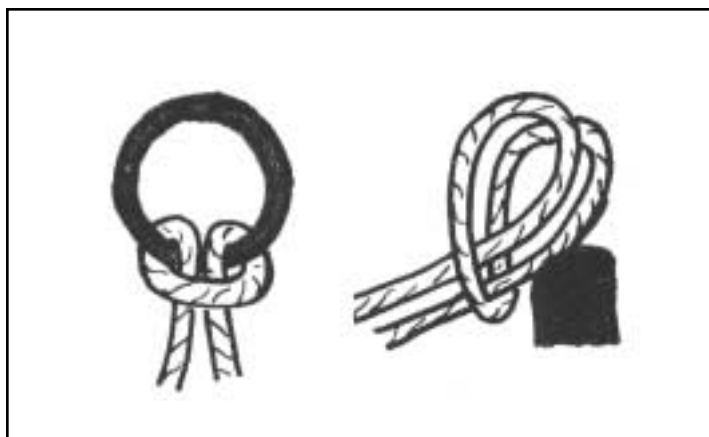
Surgeon's Knot

Another variation of the square knot is the surgeon's knot. This knot has the advantage of the first overhand knot holding while the second is being tied. When putting in the first overhand knot, wrap 2 or 3 times instead of once. This provides additional friction between the rope, making it easier to hold. The surgeon's knot is used when the rope is under tension as you are trying to tie it. It is used when retying a bale, tying an overstuffed package or during suturing.



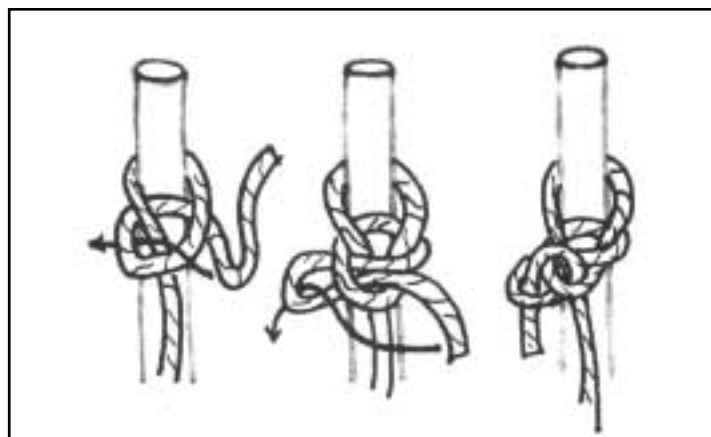
Bowline Knot

The bowline knot is the preferred knot when tying a rope around any part of an animal's body because it won't slip and tighten around the animal. Also, the knot is relatively easy to untie. First, place a loop in the rope where the knot is to be tied. The loop should be pointed toward the free end and the working part should be to the back. Next, insert the free end of the rope through the loop from the back. Go around the working part of the rope and back through the loop and tighten. To help you remember, there is a story that goes along with the knot: "The rabbit jumps out of the hole, runs around the front and down behind the tree and jumps back in the hole." With a little practice, it is a knot that can be tied quickly.



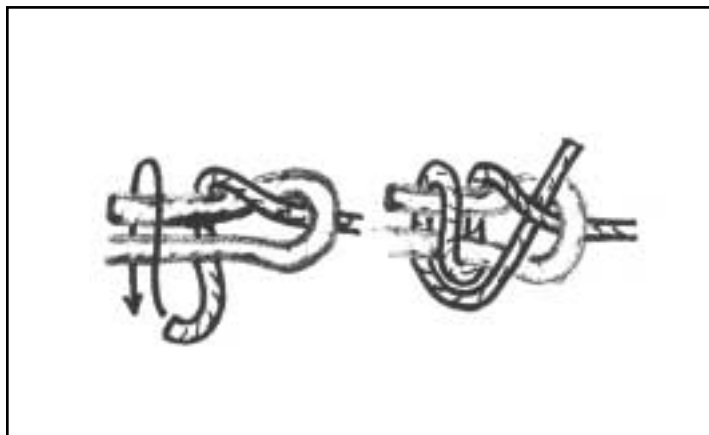
Ring Knot

The ring knot is used to fasten a ring to a rope or can be quickly formed and dropped over or tied to a post. For a drop over ring knot, make a bight in the rope, grasp the two strands with one hand and pull the bight over your hand. The resulting double loop can be dropped over a post.



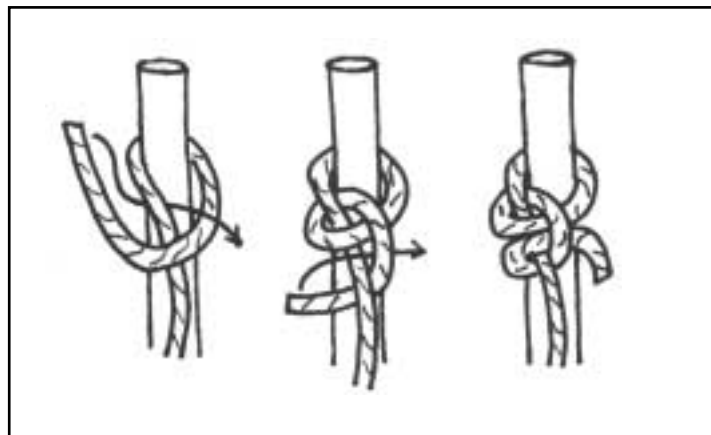
Quick Release Knot

The quick release knot is frequently used when tying a haltered animal to a post or fence. It can be released very quickly should the need arise, although it may tighten up to the point where the bow is hard to pull out. To prevent the animal from releasing itself, insert the free end through the bow after the knot is tied.



Double Sheet Bend Knot

The double sheet bend knot is used to tie two ropes of unequal size or stiffness together. If the ropes are similar, the simpler square knot should be used. To tie, form a bight in the larger or stiffer of the two ropes, then run the lighter rope into the bight, wrap it around the heavier rope and then string it between itself and the strands of the bight as illustrated.



Double Half Hitch

The double half hitch is the preferred knot if a haltered animal's head needs to be snugged up tight to a post such as for dehorning or other operations. The double half hitch cannot be released as quickly as a quick release knot, but is easier to tie while keeping the rope tight and is a more secure knot. It doesn't tighten up on itself so is easy to untie.

Making a Rope Halter

Rope halters are needed occasionally on all dairy farms. They are inexpensive to buy, but even so, it is worthwhile to know how they are made because it may be inconvenient to run to the farm supply store when one is needed. In addition, if you know how they are made, it will be easier to repair or adjust one if the need arises.

To make a halter, start with a three strand rope 12' to 15' in length. A 3/8-inch rope is suitable for calves. Halters for yearlings or cows are made from 7/16 or 1/2 inch rope.

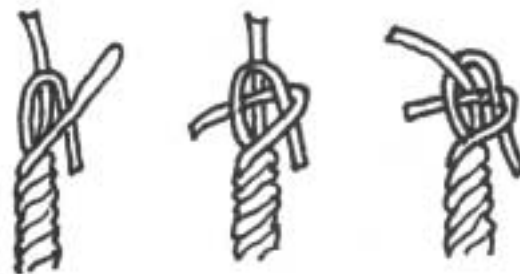
Finishing the Rope Ends

The first step is to finish the ends of the rope to prevent them from unraveling. Only one end needs to be finished if alternative 2 is used to finish the nose piece of the halter. Following are several methods used to finish the end of a rope:

1. The quickest, but not the best, way to finish a rope is to put an overhand knot in the end of the rope. The figure-eight knot as illustrated is actually a more secure knot.



2. Dipping 1-2" of the rope into an oil based paint or varnish works well except for polypropylene rope. It should dry for 24 hours before it is used.
3. The ends of nylon, dacron and polypropylene rope can be heated to fuse the fibers together. If using a flame, hold the end of the rope from the flame so that the rope heats thoroughly instead of only the outer fibers. The fibers should melt and stick together. Wear an old pair of heavy leather gloves so that you can shape the hot end in case a large knob or sharp edge results.
4. Metal wraps, hog rings, or heavy wire or wire staples bent around the rope will prevent it from unraveling if done properly. Be certain that there are no sharp edges when you are finished.
5. You can "crown" the rope by using a crown knot and back splicing. Start by unraveling about four inches of the rope.



Hold the rope in one hand to prevent it from unraveling further. Take the upper most strand and bend it between the other two, forming a bight. Wrap the next strand down around the bight. Insert the last strand into the bight. Carefully pull on each of the strands to tighten the crown knot. It should be a very symmetrical knot.



Back splicing is now done to complete the crowning of the rope. Hold the knot in one hand and twist the rope to loosen the strands. Start with any strand and bend it over the strand next to it and under the next strand, which should be itself. Do the same with the other two strands. Bending them over one strand down the rope and under themselves. Continue lacing the strands over one and under one down the rope so that each strand is tucked under 3 times. Trim the frayed ends.

Making the Halter

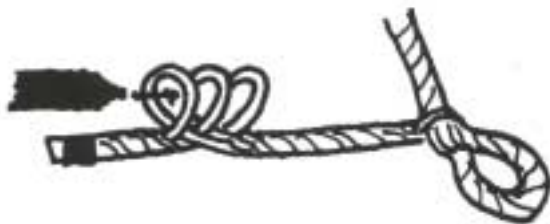


1. Measure out 12" from the end of the rope for the nose piece for a calf-sized halter. Twist the rope to open up the strands. Insert the short rope under one strand, leaving a loop twice the diameter of the rope.



2. To secure this loop, open up the strands of the nose piece near the loop. Push the long end of the rope under the two opened strands and pull it through until it is tight.

Finishing the Nose Piece (Alternative 1)

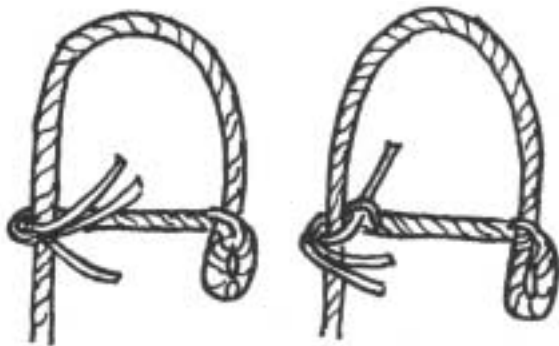


3. Grasp the nose piece near the end with one hand and 2-3 inches further down the rope with the other. Twist the rope between your hands to open the strands, then push your hands together. The strands should buckle and fold over, forming three loops. Line up the loops and put a stick the diameter of the rope through them to keep them in place.



4. Put the long end of the rope through the loops one at a time, starting with the loop furthest from the short end. Remove the stick as you go. After that is complete, run the long end of the rope through the eye loop to complete your halter.

Finishing the Nose Piece (Alternative 2)



3. With this method, the short end of the rope should not be finished. Bend about five inches over the head piece as shown. Unravel the end of the rope. Back splice the strands into the nose piece as previously illustrated on page 55. First take the center strand and insert it under the first strand of the nose piece. Repeat with the second strand. Keep the loop tight around the rope of the head piece.



4. Work around the rope, lacing the strands over one and under one so that each strand is tucked at least three times. Trim the frayed ends. After the splice is complete, run the long end of the rope through the eye loop to complete the halter.

When putting the halter on an animal, the lead rope should be on the left hand side of the animal's head (*Figure 1*). The part of the halter that tightens through the loop should be under the animal's chin. The length of the nose piece will determine how high it rides on an animal's face. A short nose piece will cause the halter to ride lower on the nose and will give you more control when leading the animal. Finished nose pieces should be about 7" long for calves and up to 14" long for cows.



Figure 1

Training a Heifer for Show

In order to have a heifer that can be shown to its best advantage on show day, schedule your work plan months in advance. Considerations include the initial selection, breaking her to lead and proper feeding.

Selection

Selection of the heifer is an important step. The heifer should be stylish, well grown but dairy, straight over the topline, and have good feet and legs. If you are unsure of your ability to select animals with good conformation, ask a person with experience to help, such as an extension agent, 4-H leader or dairy producer in your area with experience.

When selecting a heifer, know what the various age requirements for different classes are. Generally, older heifers have an advantage over younger heifers within a class. Another consideration should be the size of the heifer relative to the size of the person who will be showing it. A young exhibitor with little experience will be best off showing a young calf rather than a yearling. Disposition of the heifer might also be considered when selecting for these young exhibitors.

Finally, if there are a number of heifers in the calf pen at home, it usually makes more economic sense to make your selection there rather than going out to purchase a heifer.

Good A.I. sire selection and a sound calf rearing program should ensure that there is an adequate number of good calves to select from.

Make sure that the heifer has had all the proper vaccinations. A suggested program would be to vaccinate for Brucella, IBR, BVD, PI₃, BRSV and a 5-way Lepto at 4 months of age. An 8-way Clostridium and wart vaccine can be given one week later. One to two months later, the booster injections for IBR, BVD, PI₃, BRSV and Lepto need to be given. After one week, give the Clostridium and wart vaccine boosters.

It is a good idea to observe the feet on the heifer when she is selected to determine how much hoof trimming she might need. Most heifers should have their feet trimmed at least once before the show. An expert trimmer can do a lot to correct poor feet and improve the heifer's stance.

Halter Breaking

The amount of time required to train a heifer to lead will depend on her disposition and the techniques used. Starting at least six weeks prior to the show, the first step is to halter break your heifer. Put a halter on her and tie her in her pen so she learns to respect the halter. It is best to use a stable halter that doesn't tighten up under the heifer's jaw (*Figure 1*).

If the heifer fights the halter, a rope halter will put undue pressure on the heifer's jaw causing it to become swollen and very sore. This can interfere with trying to teach her to lead later. Do not tie her with a show halter. Try to calm the heifer during this time by talking to her and petting her on the side of the neck and shoulder. Do not pet a heifer on the poll or forehead if you are trying to tame her as this is looked at by her as an act of aggression and will agitate her.



Figure 1

Leaving the animal tied a couple of times for 1-2 hours is generally enough to halter break a heifer. If you leave the heifer tied for longer periods of time, make sure she has access to feed and water and has a well bedded place to lie down. The place and manner that the heifer is tied should be such to minimize any chance of injury.

Training to Lead

When training heifers to lead, most people prefer to use a rope halter. The halter goes on so that the part that tightens up is under the jaw with the lead rope on the left (*Figure 2*). Adjust the halter so that the nose band is low on the heifer's nose. This gives more control than if it is riding high on the face. The first time a heifer is led out of the pen, an experienced person large enough to control the heifer should be at the halter. Younger showpersons will have plenty of time to gain experience later.

To get the heifer to walk, walk at her side. If necessary, have someone walk behind her to give her a nudge or tail twist if needed rather than tugging at the halter (*Figure 3*). Give her

Working with Heifers

a little slack in the lead rope and try to walk at the heifer's pace the first time out. You'll have time to slow her down in later sessions. Try to keep it a pleasant experience. If the heifer stops, spend a few seconds talking to her and petting her before resuming the walk. After 15-20 minutes, put the heifer back in the pen. Training periods of longer than 20 minutes can be counter productive, especially if you or the heifer begin to lose patience.



Figure 4

Rarely should it be necessary, nor is it productive, to discipline a heifer by striking her. Generally, hitting a heifer only worsens her mood and confuses her. On rare occasions, traditional methods of training may not work and you might opt to expedite the process by tying the heifer behind a wagon hooked to a tractor. This method works but has a potential for abuse. Use a strong halter and drive slowly. Take every precaution to prevent injury to the heifer. Have someone walk behind the heifer to nudge her along, making sure that the heifer is walking and not sliding her feet. If you are patient, the heifer should learn quickly that it is best to trail along rather than fight the halter.

There are a couple of other techniques that people have used to train heifers in a short time. One is to tie them with a stable halter by themselves in a pen without feed or water. After twelve hours, set a bucket of water about three feet away and behind the heifer. Untie her and turn her to the bucket and let her drink. Put some feed back at the tie point, turn her back and tie her for another twelve hours. Twelve hours later, repeat the routine with the water 6 to 10 feet away. Repeat the routine with the water further away. The heifer will associate you and being lead with a positive experience in a couple of days.

Another technique is to tie a heifer's halter to a donkey's with about two feet between them and put them out to pasture. When the heifer gets jumpy, the donkey will stay still until the heifer settles down. In 2 to 3 days the heifer will be broke to lead.

After a heifer is responding well to the halter, switch to a show halter in your practices. Teach her to walk slowly and to place her legs correctly when stopped in preparation for showday (*Figure 5*). Practice backing up with pressure just at the halter. Let her get used to having other people around as she is being led.

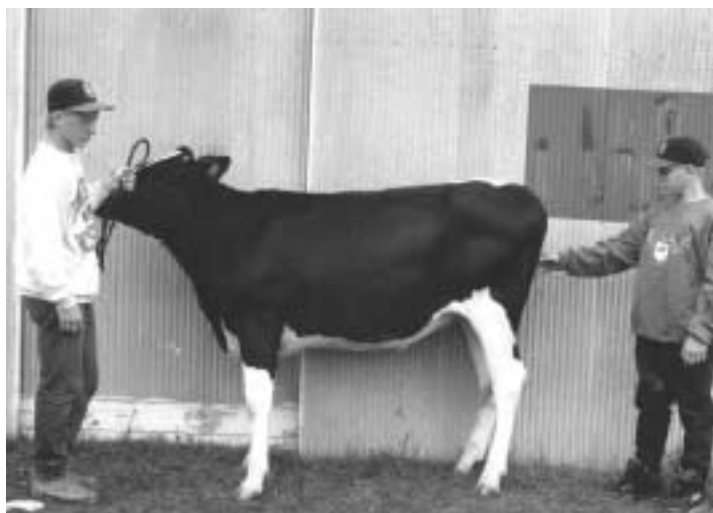


Figure 3

As much as possible, try to use positive rather than negative reinforcement. Patience, kindness and firmness, along with a little cow psychology, will most quickly train heifers.

Don't drag a heifer as it is being done in *Figure 4*. Heifers won't cooperate if they associate being lead as a bad experience.

Working with Heifers



Figure 5

Feeding

Feeding programs for show heifers shouldn't be much different than the regular heifer ration on a farm. Make use of growth charts (Figure 6) to make sure heifers are growing at the proper rate. If heifers are over conditioned, take off the condition by reducing the energy in the diet well before the fair. This is usually done by reducing the grain or excluding ionophores (rumensin or bovatec) from the diet. If grain is reduced, make sure the heifer is still getting an adequate supply of protein in the diet by top dressing a protein supplement. You want her to lose condition without arresting her growth rate.

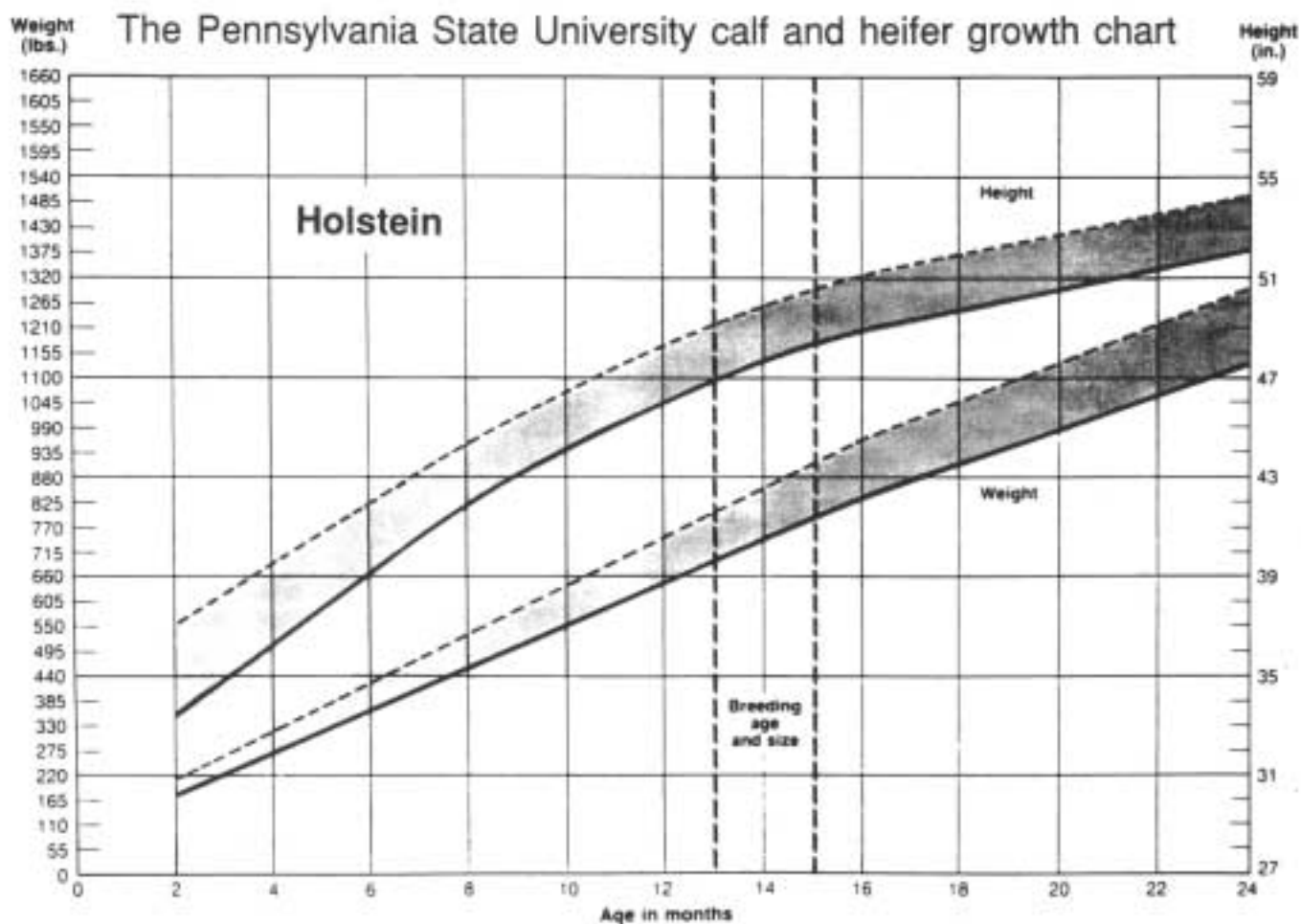


Figure 6

Clipping and Grooming for Show

Summer finds many dairy people working with a heifer or cow in anticipation of bringing home a blue ribbon. Good clipping and grooming will enhance those chances by making a short heifer appear longer, a thick heifer sharper, or a plain heifer more stylish. Becoming an expert fitter takes years of practice, patience, observations of others techniques, and some artistic ability.

The showbox of an experienced showperson is as well-equipped as a modern beauty salon (*Figure 1*). Equipment and supplies include stiff and soft bristled brushes, tail comb, rattling brush, soap, fly spray, hair spray, alcohol, spray bottle, talcum powder, hair oil, halters and hair clippers.



Figure 1

3 Weeks Prior to Show Day

Generally, clipping starts about 2-3 weeks prior to showday for heifers with a body clip (Cows usually are not body clipped unless their hair is excessively long or coarse.). A body clip entails clipping all of the hair that won't be clipped close right before the show except for the topline as illustrated in *Figure 2*. Clip against the lay of the hair. Don't clip the hair off the top of the topline. On most heifers, you will want to clip the underline at this time. On shallow bodied heifers, clip the underline about a month earlier so that you get additional hair growth prior to the show which will give her more depth. After the body is clipped, work the topline somewhat as you would before the show. Brush the hair up and clip it so that it comes to a point over the topline (*Figure 3*).

An alternative to this early body clipping is to purchase a plucking blade for your clipper. Because this blade is thicker, it leaves the hair about 1/2 inch long allowing you to body clip a heifer right prior to show. A regular blade is still used on the rest of the animal. Plucking blades are more expensive than regular blades.

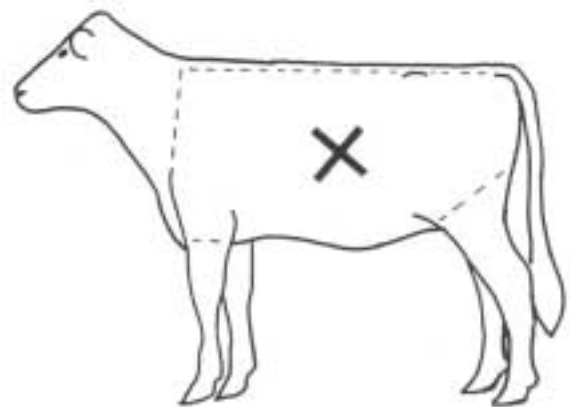


Figure 2



Figure 3

Within a Few Days of Show Day

Clip the entire head except for the eyebrows, eyelashes and hair on the muzzle. Clip against the hair, getting as close as possible. Clip the inside and outside of the ears. If the heifer has a metal ear tag be careful to avoid it with the clippers as nicking it can easily break the clipper blades. Animals are generally sensitive to being clipped on the head region. Be assertive, firm and patient. Try not to become agitated. A stanchion and nose lead may facilitate getting the hair clipped.

Clip the neck from the head to an imaginary line that runs from the point of the shoulders to the top of the shoulder blades (*Figure 4*). Do not clip past the shoulder blades. Leave the hair on top of the withers and neck near the withers. This will be clipped as the topline is worked. Clip the brisket. The front legs can be clipped from the toe up to the

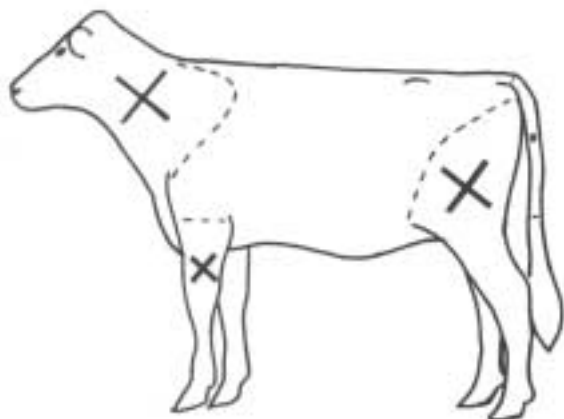


Figure 4

point of the elbow. This is especially useful to eliminate the stained hair on the knees and near the feet.

Clip the hind legs on the inside and out, from the toe up to the middle of the thigh. As you clip or work with animals, stay close and in contact with them to lessen your chances of being kicked. *Figure 5* shows the correct position when clipping the hind leg. In *Figure 6* the person is not in contact with the heifer and in a good position to be kicked.



Figure 6



Figure 5

Begin clipping the tail about one good hand width above where the switch starts. Clip against the hair (*Figure 7*). Blend as the tail goes between the pins. Clip any long hair off the vulva. If you are showing a cow, the entire udder and milk wells should be fine clipped to show off the mammary veining.

You are trying to accomplish two objectives as you clip the topline. Make the heifers topline appear level as viewed from the side and sharp, especially over the withers, as viewed from behind. First get the hair to stand up by brushing against the hair and applying a hair spray or a dry



Figure 7



Figure 8

antiperspirant containing aluminum chlorhydrate (*Figure 8*). Clean hair will stand up easier than dirty, oily hair. You may wish to wash the topline before you proceed.

Working with Heifers

There are different techniques used for clipping the topline. *Figure 9* illustrates clipping against the hair with one finger under the blade to prevent clipping too closely. Some prefer clipping with the lay of the hair. Some clip with the clipper turned over, resting the top of the clipper on the heifer to prevent nicks as in *Figure 10*. Whatever technique you choose, go slowly. Clip a little on one side and then the other. Get the hair brushed up. Continue the procedure until you've achieved the desired effects. A common error is clipping too close on high spots over the rump. This draws attention to the defect rather than concealing it. The goal is to make your heifer look as perfect as possible but still natural! *Figures 11 and 12* show the same heifer before and after clipping.

Showday

Wash your heifer in time so that she will be dry well before you are scheduled to take her into the ring. Soap and rinse your heifer twice. Be careful not to get any water into the ear. This may cause the ear to droop and heifer to hold her head to the side as you are showing her. Use a soft, damp rag to clean wax and dirt out of her ears. Clean the dew claws with a stiff bristled brush. Clean the hooves with a wire brush.

After leaving the wash rack, brush the hair down with a soft-bristled brush. When dry, brush the hair up on the topline. Have someone else hold a blow dryer as you brush and apply the hair spray. After the hair is up, you may wish to take the clippers for one last trim, making the topline as neat and sharp as possible.

Fluff up the switch with a brush and hold with hair spray. Apply talcum powder to any stained or scuffed areas such as the knees. A light coat dressing can be applied to add a sheen to the hair. Just a little will do it. The wet look is out! One technique used is to mix one-half to two-thirds oil (such as mineral) with rubbing alcohol in a spray bottle. Lightly mist this mixture on the animal's coat. Apply fly spray to the legs, if needed, and you're ready to enter the show ring.

Exhibiting an animal can provide a welcome relief from the routine work on a dairy. A proper job of clipping and grooming can enhance chances of a blue ribbon and provide a great deal of enjoyment and satisfaction.



Figure 10



Figure 11



Figure 9



Figure 12

In the Show Ring

Showmanship involves showing your animal to make her look her best at all times. Once the grooming is done, your techniques and demeanor in the show ring can often influence your final placing and give you a great deal of self-satisfaction.

Your appearance is part of showmanship. You want to look sharp, clean and alert. Clean, neat clothes are a must. Most exhibitors wear white clothing and this is preferred. White trousers with a dark, solid colored shirt has gained acceptance at some shows. Many judges prefer a heavier leather shoe or boot rather than a tennis shoe. Your hair should be well groomed and wear a smile!

Try to be at ringside a few minutes before your class is to begin. If you are there longer than that, your heifer may get tired and impatient before the class begins. It probably doesn't matter whether you are the first or the last one in the ring, but be on time!

Hold the heifer with your hand right in the halter for maximum control (*Figure 1*). Use whatever method is efficient and comfortable but also allows easy release of the halter if need be. Fold the lead strap in 10 inch loops and hold it in a convenient manner with either your right or left hand. Do not roll the lead strap in a coil, wrap it around your hand or throw it over your shoulder.



Figure 1

Enter the ring in a clockwise direction. Walk backward when the judge is observing your heifer, otherwise walk forward. Walk at a pace to fit the situation, keeping a suitable distance between you and the animal in front of you. In the ring, if the exhibitor in front of you is having difficulty moving the animal, help by nudging the animal or gently twisting the tail.

If your animal is roach backed you may wish to pinch down the topline (*Figure 2*). If she's weak over the top, poke her in the ribs to bring the top up. If the animal has excess skin in the throat, pull up on the throat with your free hand as you're leading her around the ring to make her look more clean cut and feminine (*Figure 3*).



Figure 2



Figure 3

Working with Heifers

When the judge asks you to stop, set the animal up. The legs should be squarely under the animal, with the heifer's hind leg nearest the judge back several inches. This will give the appearance of your heifer being longer. The head should be held high to make the animal look taller and more alert but not too high to make it look unnatural. In *Figure 4* the heifer is set up correctly. The same heifer in *Figure 5* is set up with her legs set too wide and head held too low. As the judge moves around to the opposite side of the heifer, move up one step to reposition the hind legs. Once a cow has freshened, the proper position of the hind legs is reversed with the leg nearest the judge forward. This allows the judge to see the fore and rear udders at the same time.



Figure 4



Figure 5

If the animal won't set up perfectly, settle for good enough. If you are constantly fussing and maneuvering, you will frustrate the animal. Never step on or handle the animal's hind feet to get them in position. Only place the front feet with the aid of your feet if the judge isn't looking. It is best to be able to set your animal up just by pressure applied at the halter. Practice prior to the show will usually allow you to accomplish this.

Be prepared to answer questions that the judge might ask relative to your animal. These include birth date and if or when she might have been bred. Know a cow's freshening and due date. In an advanced showmanship class, judges may ask questions about the sire, dam, service sire, production levels, rations, parts of the cow and other subjects to test your dairy husbandry knowledge.

Be alert. Continue to glance back and forth between your animal and the judge. Don't stare at the judge. Be aware of the signals asking you to move or stop. Don't make the judge ask you to do something twice.

Don't over show! The ideal is to show your animal to its best advantage as effortlessly as possible so as not to draw attention to yourself. Over showing, as illustrated in *Figure 6*, will tire you and the animal and is distracting to the judge.



Figure 6

When the judge motions you into line, walk quickly into position. Switch hands on the halter and walk forward (*Figure 7*). Position your animal close enough to the one next to you so that there isn't room to position another animal above you. Make sure your animal is in line with the others. Don't let yourself or your animal fall asleep while you are in line. Keep the animal's legs positioned correctly. If the judge walks by to the opposite side, remember to reposition the legs.

Working with Heifers



Figure 7

If the judge asks you to back your heifer out of line, back her by pushing back on the halter or push your right hand into the heifer's shoulder (*Figure 8*). If she won't back, lead her forward, turn and travel back through the line or around the end if you are near the end of the line. Regarding turning a heifer, it is usually recommended to turn right with the heifer because she will be less likely to step on your toes. At times, it is much more expedient to do a left turn and this is permissible. Keep your feet away from the heifer's hooves as you bring her around.



Figure 8

Keep showing your animal while the reasons are being given and as you lead from the ring. Listen to the judges reasons for his placings and try to learn from them. They may help you in another year as you select your animal.

Sportsmanship and helping others is a big part of show ring etiquette. If you notice other exhibitors that need pointers in clipping or showing, privately offer your assistance. It can be extremely rewarding to see someone come back another year and do better because of assistance you've given.

There are bound to be disappointments and disagreements with some of the placings. Judging is not an exact science and two totally competent judges may place a class quite differently. As with most of life, there is a bit of luck involved. Be a humble winner as well as a gracious loser. Be ready to congratulate the winners and give encouragement to those that were further down the line.

Below is a showmanship scorecard developed by the Purebred Dairy Cattle Association:

	<u>Points</u>
Appearance of Animal.....	30
Cleanliness	10
Grooming	10
Clipping.....	5
Condition and Thriftiness	5
Appearance of Exhibitor.....	10
Showing Animal in the Ring.....	60
Leading	25
Posing.....	15
Show Animal to Best Advantage	10
Poise, Alertness, Attitude	10
	100

Cattle Restraint

The method of restraint to use in controlling an animal depends upon the task that needs to be performed and manpower and equipment available. Whatever the method, the animal's safety and welfare needs to be kept in mind.

Restraining Calves

Before any animal can be restrained it needs to be caught. With calves, and with older animals, the easiest way to control them is by gaining control of the head. The head can be turned back against the body or controlled by grasping the lower jaw (*Figure 1*).



Figure 1

Many times a halter is needed to control animals during castration, dehorning, vaccination, etc. A very efficient haltering technique is illustrated in *Figure 2*. First tie a loop in the end of the rope, using a bowline knot. The size of the loop depends upon the size of the animal. Place the loop over the animal's ears and down around the face. Next, form an adjustable loop by pulling rope under the fixed loop. Position this loop under the animal's jaw. This halter will give good control of the animal without any danger of choking.



Figure 2



Figure 3

Another type of temporary halter is illustrated in *Figure 3*. A lariat loop or a loose loop made with a bowline knot is placed around the animal's neck. Run the lead rope from the back through the loop under the neck. This will form a loop that goes over the heifer's nose.

Calves up to 300 pounds can be laid on their side by flanking. This method of restraint works well for treating the navel with iodine or removing extra teats. After the calf is caught, grasp the flank with one hand, turn the head around toward the body with the other and put your leg, bent at the knee, under the animal (*Figure 4*). Lift and pull the animal toward you so that you transfer its weight off of its feet onto your leg. Now slide the calf off your leg to the ground. Young calves can be held down by placing one knee on the calf's neck and one on the calf's side, leaving your hands free.



Figure 4

Working with Heifers

Older calves or heifers from which you are removing extra teats usually require two people to restrain it. One person puts a knee on the calf's neck and curls the front leg back. The second person puts a foot right above the hock on the bottom leg and grasps the top leg near the pastern, pulling it up and back (*Figure 5*).



Figure 5

Another method of laying a calf down is with the use of a halter. The head is pulled around as the lead rope goes around the thigh and inside the hind leg. By pulling on the rope the hind leg is brought forward (*Figure 6*). By pulling on the rope and lifting under the neck, the calf can be slid down your leg as before. The rope can be further used to restrain the leg once the calf is down (*Figure 7*).



Figure 6

Head gates or ways to immobilize the head make operations such as dehorning a lot easier but often are not available when calves are in hutches. *Figures 8 and 9* illustrate a portable stall that was made relatively cheaply. The stall folds up after use.



Figure 7



Figure 8



Figure 9

Casting an Animal

An animal can be cast when near total immobilization is required. First, halter the animal and tie her to a secure object using a quick release knot. Next, tie the end of a 35 ft. rope loosely around the animal's neck using a bowline knot. Put a half-hitch just in back of the shoulders and another one over the loin and under the flanks (*Figure 10*). Cast the animal by pulling on the rope from directly behind. The tightening rope exerts pressure on the nerves and blood vessels supplying the legs, causing the animal to lie down (*Figure 11*). A constant steady pull needs to be maintained on the end of the rope while the management technique is being performed.

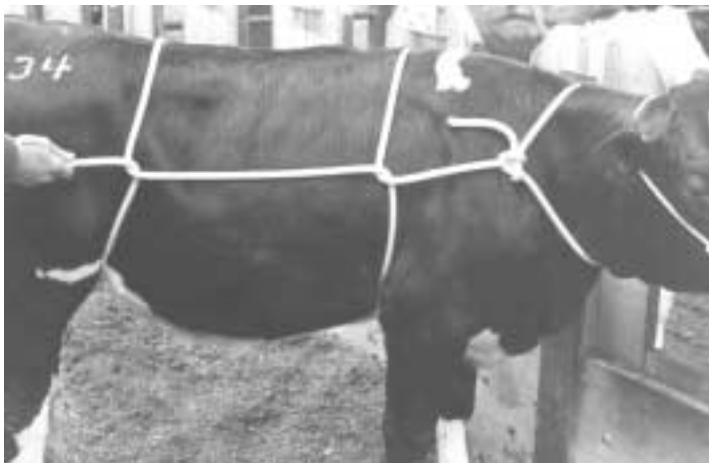


Figure 10



Figure 11

Animals should be cast only on well-bedded or grassy areas to prevent unnecessary bruising or injury. Avoid casting animals that are heavy with calf. Also, don't keep an animal lying on its side for extended periods, as bloat or pneumonia may result.

Raising the Feet

There are numerous methods for manually raising feet. None of them are especially easy or enjoyable. A smaller heifer or gentle cow may allow a person with a strong back to raise a foot manually and rest her leg on your knee or thigh. Pushing the animal's weight onto the other leg will make raising the foot easier. Using a nose lead or rope tightened around the flank may reduce struggling by diverting the animal's attention.

When using ropes, the animal should always be adequately restrained to prevent injury. The front foot can be held up by attaching a rope around the pasterns and bringing it up over the back (*Figure 12*).



Figure 12

The rear leg can be hoisted up by placing a rope just above the hock and having the rope attached over a beam. A slightly different method is to place a loop above the pasterns, pass the rope over a beam, and then back around the leg right above the hock (*Figure 13*). Don't raise the leg any further than necessary and have the cow properly restrained to avoid unnecessary risk of injury.



Figure 13

Nose Lead

A nose lead can give added restraint when needed such as for intervaneous injections and clipping the head of an unruly animal. The nose lead can be rather severe and should only be used when needed and then used properly.

To put a nose lead in, stand at the side of the animal's head. Grasp the animal by the lip on the side of the mouth and pull its head toward you (*Figure 14*). Insert the nose lead one nostril at a time and squeeze it shut. Have a firm hold of the nose lead as you release the animal's head. The animal will usually attempt to swing its head from side to side in an attempt to shake off the nose lead. The rope from the nose lead should be held or double wrapped around a pipe or post and held rather than tied. Tying the rope could cause the animal to tear its nose, should the animal go down.



Figure 14

Headgates and Squeeze Chutes

A head gate, squeeze chute and cattle handling facilities can make handling livestock much less stressful and efficient. This generally translates into management techniques being done in a more timely fashion and sick animals being treated more promptly.

There are different types of headgates on the market. Choose one that fits your cattle and the tasks that you will be performing in it. A headgate with straight vertical neck bars has much less chance of choking an animal but doesn't provide head control like curved bar stanchion headgates will. This disadvantage of straight bars can be overcome by quickly and simply slipping a halter on the animal once it is in the headgate.

Proper design of a squeeze chute includes a tailgate, removable side panels on the bottom 24 inches of the chute and removable bars above the side panels for easy access to the animal. It is desirable to have a chute with adjustable bottom widths so that when the animal is squeezed the bottom is

narrower than the top to prevent the animal from laying down. Workable inside widths at the floor are 6 inches for 500 lb. animals, 8 inches for 700 lb. animals and 12 inches for larger animals.

Occasionally, cattle in a stall or headgate refuse to get up from a lying position. *Figure 15* illustrates a method of encouraging animals to rise without causing undue excitement or injury. Simply cup your hand over the animal's nostrils. As the animal becomes short of breath, it will inevitably rise before there is any danger of suffocation. Sometimes one may be smart enough to breathe through its mouth. This is solved by holding the mouth closed with your other hand.



Figure 15

Tilt Tables

Tilt tables have generally been preferred over any other method of restraint for hoof trimming or inspection of the foot. The general procedure is to strap the animal to the table and slowly tilt the animal over. Allow the animal to settle down just a bit before tying down its legs.

Hoof-Trimming Chutes

Hoof-trimming chutes in which animals remain upright with belts under them for support have been greatly improved in past years and are becoming the chute of choice. When using older or homemade models for unruly animals, a few precautions should be taken. To prevent them from sticking their legs where they don't belong, the feet should be hobbled to the bottom of the chute except when they are being worked on. Provisions can be made so that rope can be used to raise and hold the feet as explained earlier.

Working with First-Calf Heifers

Dairymen work closely with cattle on a daily basis, and have a lot of control in determining whether this association is a pleasant one or one that causes discomfort for both. Cows are generally docile, and respond best to gentle handling and a soothing voice. Sometimes additional restraints are needed to perform a task, but the importance of calmness, gentleness and confidence on your part can't be overemphasized.

In most situations it is advantageous for the heifers to become accustomed to the milking routine and housing prior to calving. In a milking parlor situation, the heifers can be housed with the milking herd and walked through the parlor a few times prior to being taken to the maternity area. In stall barns, heifers should have a chance to get used to getting up and down in the stalls at least two weeks prior to calving.

After freshening make sure that heifers are provided plenty of clean bedding. This will help prevent slipping and bruising of legs or teats.

Some heifers may not let down their milk at the first milking. If they are wild or extremely nervous, 1 cc of Heifer Calm (rompen and oxytocin) will tame them and cause them to let down their milk. Oxytocin by itself can be used if the heifer isn't wild. Doses are decreased the next milking and by the third day the animals are milked normally. An older remedy is to stimulate the lining of the vulva with your forearm. This causes a cow to secrete her own oxytocin into the blood stream.

Heifers may need to be restrained when they first enter the milking string, to prevent them from kicking off the milking unit or kicking the milker. If the milker is gentle and calm, heifers generally return the favor. Usually, laying a hand on the rump is enough to calm a heifer. However, a few may need additional restraints, such as use of a Kow-Kant-Kick, rope or tailhold. When applying a tailhold, push up more than forward and use only as much force as needed (*Figure 1*). The Kow-Kant-Kick is applied in front of the hooks and tightened (*Figure 2*). This exerts pressure in the stifle area, discouraging any kicking.

Another restraint that acts in the same fashion is illustrated in *Figure 3*. Place a rope over the front of the hooks and around the front of the udder. Tighten the rope snugly and tie with a quick-release knot. Remove the restraint after milking is completed and the cow has been teat dipped. Don't use restraints unless needed, and then only as long as necessary.

A simple technique to restrict a two-year old's movement in a tie-stall is to tie her head to the side using a rope halter. Put

the halter on the heifer from behind as you are standing at the side of the heifer. The heifer will usually move forward in the stall and you should be able to tie her head to the side with little resistance. Tie her head to the right for right side milking and to the left for left side milking. This will naturally cause the heifer to stand to the other side of the stall in the proper position for milking.



Figure 1



Figure 2

You may wish to hobble a heifer or cow occasionally. This will prevent kicking, and also prevent a cow from injuring herself by sprawling on a slippery floor. To hobble a heifer,

Working with Heifers



Figure 3

first take two short pieces of rope and tie the first length above the dewclaws (*Figure 4*). In the same fashion, tie the other rope on the opposite leg and then join the ropes in the middle with a tight knot (*Figure 5*). Cut off long loose ends with a knife.

If the hobbles are tied to allow about 15-18 inches between the legs, they won't interfere with the heifer getting up and down or walking, and can be left on for an extended period, if necessary. A soft cotton rope will be least abrasion on the animal's legs. Remove the hobbles promptly if the legs become sore where the hobbles are attached. Cow hobbles can also be purchased for about \$20.00. The nylon hobbles are easier to apply than rope and are an excellent investment to use as a prevention aid to keep weak cows from doing the splits or over extending her rear legs which can cause serious damage.



Figure 4



Figure 5

Handling Bulls

Even with the many advantages of A.I., many dairies still keep a herd bull for cleanup or for breeding heifers. Clearly, the biggest disadvantage of keeping bulls is the danger they pose to the dairy's workers and visitors. Many people have been injured by a "friendly" or "tame" bull. Never underestimate a bull's strength, and respect the possibility of sudden disposition changes. A dairy bull should not be kept beyond 2 to 2 1/2 years of age and sold prior to that if he shows aggressive behavior. A research study found that bull calves raised in groups were less likely to attack people than bull calves raised in individual pens. The theory is that if bulls are raised with other cattle, they are less likely to think of people as part of the herd and less likely to feel the need to express dominance over a human.

Prospective herd sires should be halter-broke at a young age. Before a year of age, a bull ring should be placed in the nose of the bull. *Figure 1* shows two sizes of self-piercing bull rings. The smaller ring works well on young calves under 6 months of age. Don't put a large ring in young calves, because it may interfere with eating. When the calf outgrows the small ring, remove it and place a larger ring in the nose.



Figure 1

The procedure for putting in a ring is relatively simple. Properly restrain the calf's head in a head gate and halter. Clean and rinse the ring in an antiseptic solution. Locate the ring in the soft tissue 1/2 inch back from the nostrils (*Figure 2*), just in front of the cartilage of the nasal septum. You can easily feel the cartilage with your fingers. Piercing this may cause necrosis of tissue. Use a smooth, steady push to force the ring through the tissue (*Figure 3*). Wearing leather gloves will give you a better grip on the ring and may prevent a gash on your hand from the ring's sharp edges. When ringing a bull for the first time, it may

be easier to first pierce the nose with a trochar and canula (such as is used for bloat) or use a sharpened punch. The ring can then be pushed through the preformed hole.

Once the ring is passed through the nose, close the ring and replace the locking screw. It is a good idea to have someone hold a pail or scoop under the ring in case the screw is dropped. Or at least sweep the ground over which you are working prior to beginning the procedure. Trying to find a small screw dropped in a pile of silage is not a fun task.

With a file, take any rough edges off the joint or screw head to avoid any additional tears to the nose. It usually takes about 2 weeks to completely heal the wound, so don't use the nose ring before this time.

Observe the bull to make sure he continues to eat and that there are no complications after being rung. Remove any items from the pen that could catch the ring, such as projecting bolts or spikes.



Figure 2



Figure 3

Bulls

Work with bulls at a young age if they are to be trained to lead. It is important to keep the bull's head up, and don't step in front of him. **Never** turn your back on a bull, and don't handle or lead mature bulls without assistance. One method of leading a bull is with a heavy rope halter and a rope on the nose ring, with a person on each side to protect each other. Better yet, *Figure 4* shows the use of a staff hooked to the ring, which gives greater control of the head with a heavy rope to the other side. If the bull is extremely difficult to handle, people have used baling wire or a transcom chain through the nose to help lead bulls in the show ring. Remove the wire or chain after the bull is done being shown.



Figure 4

Never tie a bull with just a rope on the bull ring. If he becomes frightened, he may break the ring or tear it out of his nose. To properly tie the bull for short periods of time, tie the rope halter to one side of a stall and the rope on the nose ring to the other side with a little more slack (*Figure 5*). Be sure to tie the ropes low enough so the bull can comfortably lie down and stand up. If a bull does tear out his ring in which case the front of the nose is tore out, the ring can be replaced vertically instead of horizontally.



Figure 5

If bulls are kept for many years, such as in AI studs, and eat off the concrete, the concrete will wear the ring causing it to eventually break or need to be replaced. An inch long piece of rubber hose placed on the ring at the time the bull is rung will greatly extend the life of the ring.

Some dairymen hang a short chain on the nose ring (*Figure 6*), which can help in catching the bull and may make him less aggressive and less likely to charge. It also serves an excellent contact point to prevent a bull from sticking his head over an electric fence. A long chain can get caught on equipment, trees and fencing. For this reason, don't use a chain unless you observe the bull frequently. It may be a good idea to cut through the link that attaches through the ring. If the chain gets caught on an object, it should spread and pull off preventing the ring from ripping through the nose. The chain should be light enough so it doesn't put undue pressure on the nose.



Figure 6

If it is necessary to have breeding bulls run with cows, workers need to be taught to stay alert and to notice aggressive postures by the bull. One aggressive posture prior to an attack is what is called a broadside threat. The bull will stand sideways showing off how big and powerful he is. The bull may back off if a person continues to face the bull, but if the person feels threatened, it is usually best to slowly back away from the bull to safety. Don't turn and run.

Recognizing Heat Signs in Heifers

Poor heat detection in heifers delays breeding, and frustrates dairymen to the point where a bull is sometimes substituted for the A.I. technician. It is the primary reason that a smaller percentage of heifers are bred A. I. compared to older cows, even though heifers usually have a higher conception rate. Heat detection efficiency can be improved considerably by observing heifers on a regular schedule and recognizing all the signs of heat.

Although the greatest amount of riding activity probably occurs between midnight and 6:00 a.m., 15 minutes committed just to observation in the early morning and later afternoon will catch most heifers exhibiting heat. Also be on the lookout for signs of heat any time you are working around the cattle.

Standing to be mounted is the primary and surest sign of heat and the most common indication of estrus used (*Figure 1*). On the average, a heifer remains in standing heat for 14-16 hours, and will ovulate 10 hours after the end of standing heat. However, to be noted in standing heat, the heifer must be mounted by another animal which doesn't always occur or doesn't happen while the heifer is being observed.



Figure 1

To maximize the amount of estrus behavior during the observation period, it is an excellent management practice to turn the heifers into a dirt lot, away from feed bunks, for heat detection. Both the effects of movement and good footing will increase activity. If a heifer is in heat, there may be several mounts in the first few minutes in the new lot. After the observation period, put the heifers back in their regular lot. Try to keep open heifers together, because there will be more estrus activity if there is a bunch of cycling animals together. If there are only a few open heifers left in a group, move them to a pen of open heifers.

Unless observation is continuous, which is impractical, many mounts will be missed. Occasionally, heifers may stand to be mounted briefly even though they are not in heat or may even be pregnant. Therefore, to maximize breeding efficiency, take into account the many secondary signs of heat. Secondary signs vary in length and may start a day before standing heat and continue for a day after standing heat.

Heifers coming into heat and in heat are generally more active. They may walk the fenceline or pace back and forth across the barnyard (*Figure 2*). They may bellow considerably and urinate frequently. Animals that are in or near heat may attempt to mount other heifers that may or may not be in estrus and may also spend time butting heads with other animals. A heifer that attempts to mount the front end of another heifer is usually in heat.



Figure 2

Other behavior changes include the heifer testing other heifers by resting her chin on their rumps or loins. The heifer may nudge, lick or sniff the vulva of other heifers and then wrinkle its nose and curl its upper lip, similar to a bull (flehmen response). A clear, chrySTALLINE mucus is secreted by the vagina of a heifer in heat. The mucus may be seen draining from the vulva, appear as strings of mucus on the tail, or be smeared on the animal's thigh (*Figure 3*). It will glisten in sunlight and artificial light. In fact, checking the rears of cows for this chrySTALLINE mucus with a flashlight, with the barn lights off, prior to the morning milking is a good heat detection aid. It is sticky and should stretch for more than 4 inches when touched by two objects and pulled apart. Contrasted with nonestrus vaginal mucus secretions which are much smaller in quantity, cloudy rather than chrySTALLINE and less sticky, this clear mucus discharge is a good indicator of heat.

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Figure 3

There may be noticeable physical changes in some heifers. The vulva may swell with a reddened lining. It will have a puffy appearance, and instead of many fine wrinkles, it will have fewer, deeper wrinkles (*Figure 4*). The secreted mucous may mat the hair and give the lip of the vulva a wet appearance. The pelvis may rotate causing a slight depression in the loin and an elevated tail or tailhead.



Figure 4

If a heifer has been ridden, the hair on her tailhead may become ruffled or rubbed off (*Figure 5*). In muddy conditions, there may be mud on her rump and flanks. Even though not directly seen in standing heat, these are telltale signs that she was recently in heat and may conceive from an insemination at this point.



Figure 5

Approximately 90% of heifers will have a small bloody discharge 1 or 2 days after estrus. This may be noticed as a discharge from the vulva or as a string or smear of blood on the tail or flank. This discharge is from the breaking of small blood capillaries in the lining of the uterus caused by changing hormonal levels during and after estrus. It is not related to whether the heifer conceived or not.

Usually, it's too late to breed a heifer when you notice blood. Record the heat on a heat expectancy chart so you can anticipate the next heat period. An alternative that may get her bred earlier would be to wait 10 days, then inject her with prostaglandin and breed her when she comes into heat or 80 hours after injection.

All of the rules relative to catching heifers in heat also apply to cows. Cows may also have a decrease in milk production while they are in heat.

Using a Heat Detection Aid

Heat in cattle can be missed because of several factors even when they are observed 2 or 3 times daily. Up to 25% of animals are in standing heat for less than 8 hours. In addition, animals may be mounted only 5 or 6 times during their heat period. For these reasons, heat detection aids can help detect animals that stand to be mounted between observation times. Using both heat detection patches and paint can be more effective than using either by itself.

When using a heat detection patch, it is important to apply it properly in the correct position. Generally, the patch should be placed about a third of the way from the hooks toward the pins (*Figure 1*). For animals with high tailheads, place the patch further back toward the tail. Use good judgment in determining the best position so it will come into best contact with the mounting animal.



Figure 1

To prepare the site for the patch, first remove dirt and loose hair with a currycomb. If the hair is extremely long, as under winter conditions, you may clip it down to 1/2 inch in length. Apply a gob of glue about the size of a quarter (*Figure 2*). Use the spreader to spread the glue. Press firmly to assure good penetration of the glue. Next, put a smaller gob of glue on the back of the patch. Use the spreader to spread it out evenly to all the edges. With the arrow pointing forward, press the patch on the prepared area of the tailhead.

Here are a few additional tips on applying detectors:

1. Do not use too much glue. Detectors will not stay on as well if an overly generous amount of glue is used.
2. Store detectors in a cool, dry place and use before expiration date.



Figure 2

3. Don't allow glue in the tube to freeze.
4. Write the animal's ID number on the detector (*Figure 3*). If a detector is lost, perhaps during mounting activity, it can be rematched to the animal.



Figure 3

5. If a new detector is to be placed on an animal and the old one is still firmly attached, cut off the plastic bubble and cement the new detector over the old one.
6. Remove obstacles that cattle may rub against and falsely trigger the detector.

After the detector is in place, paint can be applied over the midline of the rump from the hooks to back over the tailhead (*Figure 4*). Use a stiff brush to apply the paint, making sure that the paint penetrates down to the skin. Make a final backward stroke to produce a smooth strip of paint about 8 inches long and 2-3 inches wide. Both water soluble latex or oil-

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based paints are suitable, or you may purchase a specially-developed heat detection paint from your A.I. supplier.



Figure 4

The paint can aid in heat detection because it is rubbed off when the animal is mounted. Different color paint can be used, depending upon breeding status. For example, all animals that have not been bred can be painted yellow. Once bred, their tailheads can be painted blue. At a glance, you can see which animals have and have not been bred. After animals are bred, you may wish to just use paint without applying another detector.

Marking crayon can be used instead of paint. The crayon may be more convenient to handle and apply. But under humid conditions, it may require daily application, while paint needs replacement only every 1-3 weeks.

All animals should be observed for visible signs of estrus and triggered heat detection aids at least twice daily. If the heat detector has been triggered or is missing and the paint has been rubbed off (*Figure 5*), the animal was probably in heat. Try to confirm this with other visible signs of heat or behavior changes before breeding the animal. False positives do occasionally occur, but are less likely when heat detectors and paint are used in combination. If the heat detector is missing or triggered but the paint is not rubbed off, it is questionable whether the animal was in heat.



Figure 5

An alternative or addition, is to use an implanted free-martin heifer or small, healthy cull cow to help find animals in heat. Four implants of Synovex H are placed in each ear in different locations. Eighty percent of heifers will respond in 1 to 2 weeks and stay active for 4 to 6 months.

Heat Synchronization

Heat synchronization can reduce time required for estrus and help get heifers bred at younger ages as well as getting cows rebred with fewer days open. Products and programs for synchronizing cattle are changing and new ones are under development. Syncromate-B for heifers has recently been taken off the market at least temporarily in the United States leaving prostaglandin injections given alone or with the feeding of MGA as the one alternative for heifers. Prostaglandins alone or with GnRH in an Ovsynch program are popular for dairy cows. Intra-vaginal devices for heifers are currently under development.

Syncromate-B

The equipment needed to use syncromate-B includes a restraining chute, small table or work bench, disinfectant, shallow pan, small scrub brush, implant gun, small syringe with one inch, 16-gauge hypodermic needles, slender forceps and hair clippers (*Figure 1*).



Figure 1

Restrain the heifer. Limit movement of her head as much as possible. Prepare the ear for implanting by clipping the hair on the ear midway between the base and tip (*Figure 2*). Clipping makes implanting easier and more sanitary. Scrub the area with a brush and disinfectant.

Affix a sterile needle to the implant gun. A sterile needle is needed to avoid infection and prevent transfer of blood-borne disease organisms from one heifer to another. Remove the sheathed implant from the foil pack and load it into the implant gun. Let the plunger rest against the implant and push the implant 1/16 inch out of the sheath.

With the beveled part of the needle away from the ear, insert the needle just under the skin. Avoid hitting any major blood vessels or puncturing the cartilage. Push the needle between the skin and cartilage (*Figure 3*). With the needle in all the way, push the plunger to eject the implant under the skin (subcuta-



Figure 2



Figure 3

neously). The outline of the implant should be visible through the skin. The implant contains Norgestomet, which acts similar to progesterone.

An injection containing Norgestomet and estradiol valerate (estrogen activity) is given at the same time as the implant. These compounds are relatively safe, will not cause abortion and work at any point in the estrus cycle. This injection is given intramuscularly (IM) in the neck or in the thigh below the pins. A sterile needle should be used for each animal to prevent infection and contamination of the unused portion of the liquid left in the bottle (*Figure 4*).

After 9 days, again restrain the heifer for implant removal. Disinfect the back of the ear. With the tip of the disinfected forceps, open the original needle opening (which will now be partially healed) up to the implant (*Figure 5*). Once the opening is reestablished, you may remove the implant by pushing on it with your thumb nail.



Figure 4

Timed insemination needs to be done 48-54 hours after the implant is removed from the ear. Labor required for heat detection is eliminated. However, if a heifer is noticed in heat, it is preferable to breed her 12 hours after heat is first exhibited.



Figure 5

Prostaglandin

Prostaglandin (Lutalyse, Estrumate, Bovilene) injection synchronizes estrus by causing the regression of the CL (corpus luteum). There are many different ways prostaglandins can be incorporated into breeding programs.

Alternative 1: Check heat for 5 days - breed animals caught. Day 6 - inject remaining animals. Breed animals after they come into heat. 96 hours after injection breed all animals not yet bred.

Alternative 2: Inject all animals 11 days apart. Begin heat detection after second injection and breed after caught in heat. 96 hours after injection breed all animals not yet bred.

Alternative 3: Inject all animals and check for heat for 6 days - breed after caught in heat. Day 11 – re-inject all animals not yet bred and breed as in Alternative 2.

Expect conception rates to be the same as non-synchronized animals if animals are bred when showing signs of heat. Conception rates are generally lower if animals are timed bred without estrus observed.

Prostaglandin plus MGA

MGA is not approved for lactating dairy cows but can be fed to heifers to synchronize estrus. MGA is fed for 14 days at the rate of 1/2 mg. per head per day. The MGA is then withdrawn from the feed and a prostaglandin injection is given 19 days later. All heifers are bred 72 hours after the prostaglandin injection or as they come into estrus.

Ovsynch Program

The ovsynch program for lactating dairy cows was introduced about five years ago and has been successfully used on many dairy farms. It synchronizes ovulation more so than estrus. In fact, many cows will not show signs of estrus on the program. The basic program is 3 injections. Recent studies have shown a good increase in conception rate using 5 injections. The basic program is to give a 2 cc injection of GnRH on day 0, 5 cc injection of prostaglandin on day 7, and a 2 cc injection of GnRH on day 9. The cows are bred 16 hours later. With the 5 injection programs 2 additional injections of prostaglandins are given 26 and 12 days before the first GnRH injection. Some people have been successful reducing the GnRH dose from 2cc to 1 cc. If the reduced dosage is used, the injection should be given deep in the muscle with a 20 gauge 1 1/2 needle to prevent run back. Another practice shown to increase conception rates is to give BST at the same time as the first GnRH injection.

With any synchronization program, it is important to have a follow up program after the animals are inseminated. An example would be to chalk tailheads eighteen days after the insemination and observe for estrus. Breed animals observed in heat. All animals not returned to estrus should be pregnancy checked between 38 and 45 days.

	<u>Synchromate-B</u>	<u>Prostaglandin</u>	<u>Prost. + MGA</u>	<u>Ovsynch</u>
Wholesale cost	\$6.00-\$8.00	\$1.50-\$2.00	\$3.00-6.00	\$5.00-\$9.00
Requires Implant	Yes	No	No	No
Causes Abortion	No	Yes	Yes	Yes
Works all Days of Heat Cycle	Yes	Only Days 5-18	Yes	Yes
Ability to Synchronize Heats	Excellent	Good	Excellent	Excellent
Must Obtain Through Veterinarian	No	Yes	No	Yes
Approved for Lactating Cows	No	Yes	No	Yes

Artificially Inseminating Cows

Proper and thorough initial training from professional personnel is required to learn how to artificially inseminate cattle. It's important to review techniques periodically to avoid adopting poor procedures that may lower conception rates. Poor habits can be picked up over a period of time without the inseminator being aware of the change in his routine.

If stored in a cold area, warm the insemination gun and sheath prior to loading the semen into the gun. Once the insemination gun is loaded, place it under your coveralls or shirt (*Figure 1*) to prevent exposure to cold or sunlight, both of which are detrimental to sperm survival. Post-thaw temperature fluctuations will damage sperm.



Figure 4

A disposable plastic glove-sleeve is used for cleanliness and protection from disease. Lubricating the glove will make entry into the rectum easier and reduce irritation to the cow. Lubricants are available from A. I. suppliers, or a mild lubricant such as K.Y. Jelly or mineral oil may be used. Avoid using detergents or soaps that may be irritating to the rectum and harmful to sperm if contact is inadvertently made with the semen.

After the hand is inserted into the rectum and fecal material removed, locate the cervix. Gently feel the uterine horns to determine if everything is normal and the cow is ready to inseminate (*Figure 2*). *Figure 3* shows a normal, open tract

on the right and a pregnant tract on the left. The pregnancy is in the left horn and is about 50 days along. If the horns do not seem normal, it would be wise to have a veterinarian check the cow on his next visit.



Figure 2



Figure 3

With your free hand, thoroughly wipe the area around the vulva with a paper towel before inserting the insemination gun. By bringing the hand in the rectum toward the rear of the rectum and exerting a slight backward and downward pressure with the wrist, it is possible to open the vulva lips to make insertion of the insemination gun easier and more sanitary. Usually, the gun will slide easily right up to the cervix.

To start the gun into the cervix, grip the end of the cervix nearest you and manipulate it over the tip of the gun. If need be, push the cervix forward to free the insemination gun from folds in the vagina. After the gun tip starts into the

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cervix, manipulate the cervix to ease passage of the instrument through the rings into the body of the uterus, where the emerging gun can be felt. Never force the insemination tube. Do not insert the gun beyond the body of the uterus, as the uterine walls are fragile and can be damaged.

Feel the end of the cervix and insemination gun between thumb (over top) and index finger (underneath). Pull the gun back into the cervix about 1/4 inch for deposit position. *Figure 4* illustrates the proper placement of the gun for deposition of the semen in a cut-away view of the reproductive tract. The tip of the insemination gun should be over the third ring, so semen flows unrestrained into the body of the uterus.

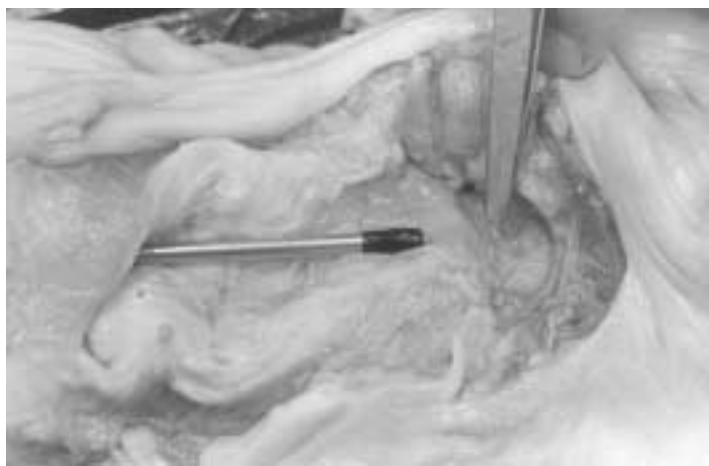


Figure 4

As you get ready to make the semen deposit, keep hold of the cervix to make sure its relative position to the insemination gun does not change. Make sure your forefinger is not blocking the flow of semen. Depress the metal plunger over an 8 to 10-second period to deposit the semen (*Figure 5*). Do not pull back on the gun or change the position of the tip of the insemination gun as the deposit is being made. Maximum conception rate will be realized if all the semen is deposited in the proper position to assure sperm transportation into both uterine horns.



Figure 5

After the insemination gun is withdrawn, check to make sure all the semen was deposited and that there was no abnormal discharges from the reproductive tract on the sheath. Reverse strip your glove off your arm so that the used sheath and manure is trapped inside. Dispose of properly.

Even if multiple cows are being inseminated at the same time, a new disposable glove should be used on each cow. This same recommendation is important when doing pregnancy checks or reproductive palpations. Using the same glove on multiple cows greatly increases the danger of passing blood born diseases, such as leukosis, from cow to cow.

The procedures outlined here are for depositing semen into the body of the uterus. Some people advocate horn breeding, but that procedure has not been as widely accepted. Choice of procedure is one of personal preference as they both have given acceptable results.

Storing and Handling Frozen Semen

Frozen semen remains viable for years if properly stored and handled. Improper handling can render it useless in a few seconds. Therefore, it is important to use proper procedures to safeguard your investment.

Semen is stored at -320°F in a cryogenic tank filled with liquid nitrogen. The semen is safe as long as there is liquid nitrogen in the tank, but is ruined in a matter of minutes if the tank runs dry. Semen tanks must be handled with care to prevent damage, which may break their vacuum seal. If the tank must be moved, always pick it up by both handles and set it down gently. The tank should be stored on wooden blocks or a pallet rather than on concrete to prevent corrosion. To check the nitrogen level, lower a measuring stick, which can be obtained from your A.I. supplier, to the bottom of the tank. After 10 seconds, remove the stick and wave it in the air. The frost line on the stick indicates the nitrogen level (*Figure 1*). Record the reading. Weekly checks will indicate any abnormal nitrogen losses. The chart below will help to determine the proper nitrogen level at each check. If you notice rapid nitrogen loss, frosting or sweating, semen should be moved into another tank immediately.



Figure 1

Ideal Nitrogen Levels in Your A.I. Tank				
Weeks after refill	Tank type, 4-week	8-week	16-week	20 to 24-week
- - - - -ideal nitrogen level in centimeters - - - - -				
1	23			
2	18	23		
3	10 to 13			
4	3 to 5	10 to 13	23	
6		18		23
8		3 to 5	18	
12			10 to 13	18
16			3 to 5 18	10 to 13
24				3 to 5

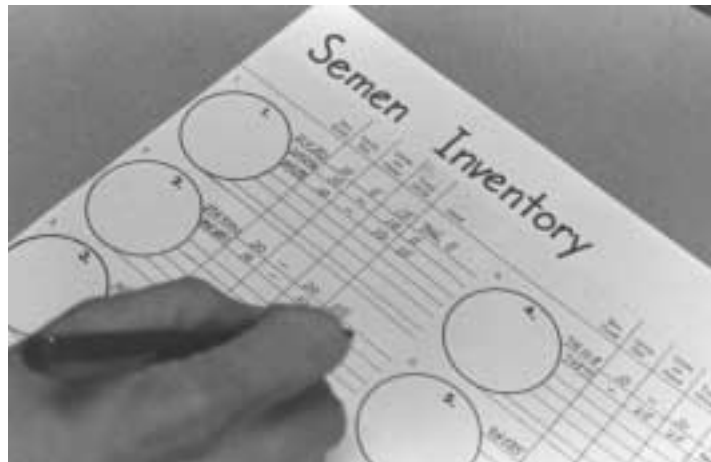


Figure 2

Source: ABS Global, Inc. *A.I. Manual*, 1996

Keep a semen inventory record near the tank (*Figure 2*). The inventory needs to identify semen, quantities left and proper canister assignment. This record will help locate semen quickly without unnecessarily exposing semen to warm temperatures while hunting for a specific straw. An inventory also helps determine needed semen purchases. There is little reason to have more than a 6 month semen supply. Semen becomes genetically outdated as new and better bulls continuously become available. Discard genetically inferior semen.

The most common semen package is the 1/2 cc. straw. When removing semen, never raise the canister above the frost line, which is about 2-3 inches from the top of the neck tube (*Figure 3*). Semen can be damaged if exposed to temperatures above -112°F, which is the temperature near the frost line. Temperatures increase to 0°F at 1 inch from the top of the neck tube and 36-54°F at the top of the neck tube, depending on room temperature and level of nitrogen in the tank. The damage to sperm from exposure to elevated temperatures is cumulative. Recrystallization of ice begins with

Reproduction

exposures to temperatures above -112°F , which will lower semen quality even if exposure is for only a few seconds.

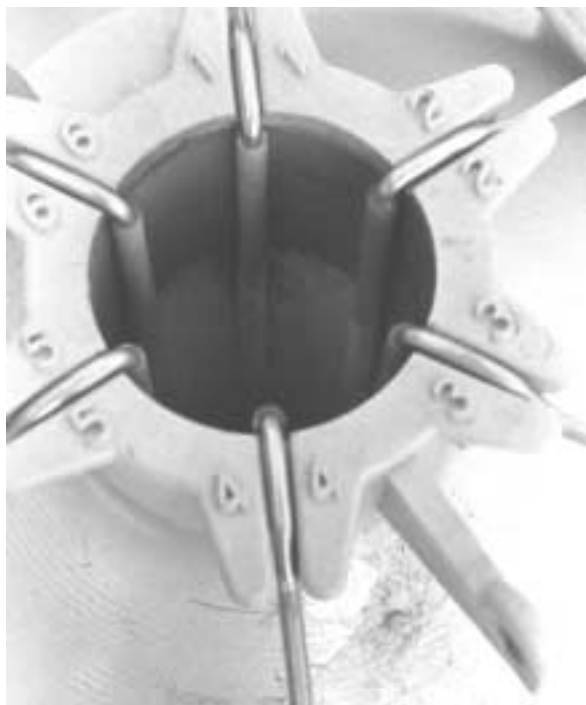


Figure 3

To remove semen, raise the canister just high enough to identify the sire by the top of the cane (*Figure 4*). Lower the canister briefly to equalize the temperature, raise it again and quickly remove the desired straw. If the straw is not removed within 7 seconds, lower the canister back into the tank for about 30 seconds to equalize the temperature of the semen back to -320°F . Then raise the canister again to remove the straw.



Figure 4

Hold the removed straw on the sealed end as you remove it from the tank. Otherwise, unequal thawing will result where your fingers touch the straw. Shake the straw sharply to remove the nitrogen from the cotton plug, and thaw according to semen supplier recommendations. General recommendations are to drop the straw immediately into warm water ($90\text{-}95^{\circ}\text{F}$) after removal from the canister. Thaw the semen for at least 40 seconds. This procedure will give satisfactory results with all 1/2 cc. straws.

Don't guess the water temperature. Use a thermometer. Periodically, check the thermometer against another one to make sure it is accurate. A thermos with a thermometer is highly desired (*Figure 5*). These units can be purchased from A.I. suppliers for \$10-15. Electronic thaw devices are also available. It is safest and highly recommended to thaw semen one straw at a time, and get it into the cow as soon as possible. However, satisfactory results have been obtained by thawing up to 10-15 straws at once if proper procedures are used. Straws should be stirred so that they don't "freeze" together during the thawing process. Waterbath temperature needs to be maintained until the straw is removed.



Figure 5

Once a straw has been removed from a nitrogen unit, it must be used or discarded. In 80°F air, an individual straw warms to -112°F in only 3 seconds. Even though it still may appear frozen, the straw should not be returned to the tank.

Hopefully a few of these hints will aid your A.I. breeding program.

Trimming Hooves

Condition of the feet and legs on dairy cattle shouldn't be taken lightly. A cow with sore feet may realize losses in milk production, diminished breeding efficiency and decreased salvage value in the case of severe lameness. As the number of cows in confinement increases, the need for periodic hoof trimming is necessary for cows to reach their full genetic potential.

Hoof trimming is very labor intensive, which is why many times it is neglected. Before you can begin hoof trimming, you must understand what the correct hoof shape is. *Figure 1* shows a diagram of a correctly shaped hoof. Notice the 45° angle of the hoof to give the greatest amount of shock absorption through the pastern yet provide plenty of heel depth. Another way to get an idea of a correctly shaped heel is to look at a young calf's hoof (1-2 months old). Toes on each hoof should be about equal length, with all four feet approximately the same shape. The hind feet are likely to get longer on the toes than the front feet, and may need trimming more often.

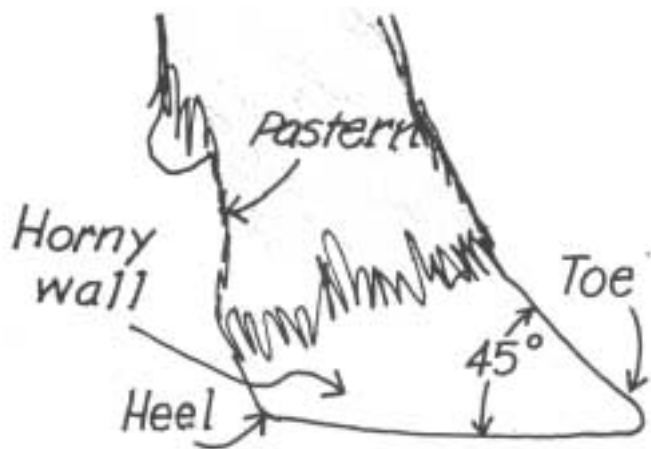


Figure 1

Trim the feet of cows that show excessive hoof growth or signs of lameness. It is best to trim hooves when cows are in the latter part of lactation so you don't disturb milk production. One of the more popular methods of restraining a cow is to use a tilt table (*Figure 2*). This allows for total restraint of the cow, but does have the disadvantage of making it more difficult to check for the correct foot angles.

Assemble the proper equipment, shown in *Figure 3*. Use a couple of hoof knives (search knives), a rasp (some prefer



Figure 2



Figure 3

an electric sander), hoof nippers and gloves to protect your hands. Be sure the hoof knives are sharp. This reduces the force required to use them, making them much safer.

Hoof trimming should be supervised or taught by a veterinarian or professional hoof trimmer until you become accomplished at the skill. When the cow is restrained properly, begin with the hoof knife. *Figure 4* shows removal of old hard sole towards the toes. You should remove very little tissue from the heels, but take more off as you pull towards the toes. The goal is to get the length in proper proportion to the foot shape desired.

Avoid cutting too deep. Generally, it is better to under trim than over trim. If you see any pink tissue, stop before you draw blood. There are exceptions to this, in the case of abscesses or other foot problems.

After the sole is sufficiently pared down and no problem area is spotted, use the nippers to shorten the toe and shape the hoof (*Figure 5*). Cut from the underside of the hoof.

Foot Care



Figure 4



Figure 5

Again, take small bites at a time so you don't injure the foot. The finished hoof should be slightly concave so most of the weight is supported by the outer horny wall. The hoof should set flat when placed on the ground. This can be checked while the cow is still on the table by placing a small board on the bottom of the hoof. A common mistake is to trim too much from the toe, leaving a rounded bottom to the hoof.

Finish the hoof by rasping or sanding the rough areas so you don't leave an area for bacterial growth. Be careful so you don't get the foot hot if you use a disk sander. The excess heat can cause internal damage and abnormal hoof growth. Some trimmers coat the hooves with iodine when they're finished, to help dry the hoof and act as a bactericide.

Several other practices to compliment your hoof trimming are:

1. Keep cattle areas dry. Wet floors tend to keep the soles soft, so they are subject to more mechanical injuries and foot rot.
2. Use a copper sulfate foot bath to help control foot rot.
3. Allow the cows plenty of room to exercise so they wear feet down.
4. Don't turn freshly trimmed cows out on rough, frozen ground.
5. Use a well-balanced ration with an adequate amount of fiber.
6. Seek out professional help if needed.

Hopefully, a few of these ideas may improve hoof care in your herd.

Treating Sole Abscesses

Lameness caused by a sole abscess can occur in any herd. Sole abscesses generally occur in the hind feet and most often during the first half of lactation. More foot problems are seen in the winter months because wet floors soften the soles of feet, making them more susceptible to abscesses and other injuries.

Sole abscesses are usually a result of a puncture wound from a nail or sharp object. They are also caused by cows walking on overgrown hooves. This causes bruising and results in an abscess.

A sole abscess needs to be treated promptly to prevent the spread of infection into the toe joint, causing permanent injury. A novice should always seek the help of a professional hoof trimmer or veterinarian.

Lift the infected foot and wash it with a sanitizing solution (*Figure 1*). This allows for better observation of the foot. Usually a sole abscess won't cause the foot to swell, but if you tap on the bottom of the hoof with the handle of the hoof knife, the cow exhibits pain.



Figure 1

The next step is to remove excessive tissue from the bottom of the sole as you would for regular hoof trimming. Remember to remove more from the toe than the heel. Once the sole is pared down, try to find a spot where a black mark or line shows through the cleaned off sole. This black mark is usually from dirt that got into the puncture wound, or where some puss was released, leaving an opening that was contaminated by dirt and manure. Dig out the sole of the foot, following the black line to the abscess. Pus usually

s spurts out of the abscess, leaving a hole in the foot. To provide adequate drainage, pare-out the wound area and dead tissue, as shown in the heel abscess in *Figure 2* and the toe abscess in *Figure 3*.



Figure 2



Figure 3

After you provide adequate drainage, it is important to use some type of topical antibiotic or sulfa drug to help promote healing. *Figure 4* shows the use of a mastitis infusion tube to apply antibiotic directly into the wound to prevent infection. Be sure to consult your veterinarian on milk withholding when using antibiotics. Follow labels properly. Once the antibiotic is applied, copper sulfate may also be used as a wound dressing. It can prevent the open wound from becoming a foot rot problem.

After applying the wound dressing, pack the affected claw with cotton and wrap it to help protect the wound (*Figure 5*). Reusable urethane boots are also available for this purpose. The wrapping will wear off in a couple of weeks on its own.

Foot Care



Figure 4

If the claw has had an extreme amount of tissue removed, it may be advisable to glue a wooden block to the bottom of the unaffected hoof. This will keep weight off the injured claw and prevent further mechanical injury.

An important role of the dairy herdsman is to decrease the incidence of sole abscesses through good management. Develop a regular hoof trimming program. It's best to trim cows' feet toward the end of lactation or as they are being dried off. Keep cows on well balanced diets with adequate amounts of fiber. High concentrate diets tend to lead to more foot problems. Also select cows for better feet and legs. Prevention and early diagnosis are keys to eliminating sole abscess problems.



Figure 5

Using Footbaths

Foot rot and heel erosion are two common foot ailments of cattle leading to lameness and decreased production. Both are caused by a bacterial infection. Hairy heel warts are also a common cause of lameness. All three can be prevented or reduced with proper sanitation and judicious use of a footbath. They are often misdiagnosed. Foot rot is also referred to as foul-in-the-foot. Common names for heel erosion are stable rot or stall rot. Other names for hairy heel warts include interdigital dermatitis and strawberry heel.

Cows with foot rot suddenly become noticeably lame. Generally, only one foot is affected. It usually begins with a bacterial infection between the toes that, left untreated, can spread into the points of the foot and cause permanent damage. The foot swells most noticeably in the pastern area (*Figure 1*). If you stand behind the cow, you can see the swelling forcing the claws apart. The cow may run a temperature with a drop in milk production. There is a characteristic foul smell from between the toes. After foot rot is diagnosed, administer antibiotics or sulfonamides, following proper dosage and withdrawal times. Wash the area between the toes with a mild disinfectant, and remove any loose, decaying tissue. Trim diseased hoof tissue.



Figure 1

Heel erosion occurs in different stages with varying symptoms. Initial symptom is a wet, clear or gray-colored inflammation on the skin between the claws. The initial stages generally do not cause lameness, fever or noticeable production drop. Antibiotics generally have no effect. In the next stage of infection, the bacteria can infect the heel of the hoof, causing heel erosion (*Figure 2*). This can lead to degeneration of the hoof, abnormal hoof growth, sole abscesses and permanent hoof damage. Heel erosion is most prevalent in confinement.



Figure 2

Typically, hairy heel warts are first seen on the heel bulbs of the hind feet. They occur less frequently on the front feet. They can also occur in the interdigital area toward the front of the foot. The warts may have projections resembling hairs. The lesions can become ulcerated, with erosion of the area between the skin and hoof.

Proper use of footbaths can greatly reduce infectious foot problems in cattle. Footbaths can be purchased commercially or constructed inexpensively with exterior plywood as the base and 2x6's for the sides. A bead of silicone caulk or sealant between the 2x6's and the plywood prior to assembly will help seal the joints. The footbath solution will act as a preservative for the wood.

The bath should be at least 8 ft. long and wide enough so cows can't walk around it. Generally, the footbath is placed in the exit lane of the milking parlor so cows walk through it twice a day (*Figure 3*). In stall barns, the bath may be located outside the exit door so cows walk through it as they exit and enter.

Copper sulfate and zinc sulfate are two compounds shown to be effective against foot problems when placed in a foot bath at 5%. To calculate the gallon capacity of the footbath, multiply length x width x depth x 7.46. There are 7.46 gallons in a cubic foot. One gallon weighs 8 lbs. For a 5% copper sulfate footbath, add 4 lb. copper sulfate per 10 gallons of water (*Figure 4*). Tetracycline and Oxytetracycline at .1% or Lincomycin at .01% have shown to be effective against hairy heel warts.

Once the problems have been reduced, cutting the concentration to 2½% should be sufficient. The footbath should be emptied and replenished if it becomes diluted with waste. This might be multiple times per day on large herds or weekly in small herds. One practice is to replenish the bath



Figure 3

and allow cows to walk through it for 4 days, then dump it and leave it empty for 3 days. On the eighth day, replenish and repeat the cycle. Another option might be to use copper sulfate for 5 days and Lincomycin for 2 days. You may have to experiment to find the program best for your situation.



Figure 4

Other considerations include:

- The footbath should be deep enough to submerge the foot past the hairline.
- If introducing a footbath to cows for the first time, just fill with clear water for a day until cows get used to stepping through it.
- To lessen contamination of the footbath, a clear water footbath can be placed prior to the chemical bath to cleanse the cow's hoofs. Suspect cow's feet can be sprayed off in the parlor so that they have better contact with the chemical in the footbath.
- Place footbaths in places where they are easy to clean and maintain.
- If multiple groups of animals work through a bath, replenish the footbath so that each group gets the fresh solution in rotation.
- Solutions that are mixed too strongly can harm the skin on a cow's foot or may splash up on a cow's teats. Do not use concentrations greater than 5%.
- If the skin on the cow's feet becomes irritated, discontinue the footbath for 2 weeks. If the condition persists, consult your veterinarian.
- Try to provide cows with a fairly clean, dry environment after they walk through the bath. A footbath will have little effect if the cows walk from it into 6 inches of muck.
- When a footbath is emptied, the solution should not cause contamination problems if it is added to the barn manure waste.
- Some dairy farms have found success preventing hairy heel warts with a copper sulfate and lime paste. It is recommended to mix 5 lbs. of copper sulfate in 25 gallons of water in the footbath. After it dissolves, mix 25 lbs. of hydrated lime in with a hoe to form a paste.

A footbath will not solve lameness problems if there are other weak points in management. The ration needs to be balanced, especially assuring adequate fiber level. Hooves need to be properly trimmed. Improper trimming can cause more harm than good by putting uneven stresses on the hoof. Cows' feet should be kept as dry as possible. Giving cows daily access to a drylot or pasture can alleviate foot problems.

Good Milking Management

Proper milking procedure efficiently uses labor and maintains udder health while obtaining the available milk. The old rule of prepping a cow for at least 20-30 seconds and applying the teat cups within 1 minute after initiating prepping are still good goals. However, variation from these guidelines to accommodate different milking systems can occur without decreasing milking effectiveness in modern high producing cows as long as the routine is fairly consistent. Regardless of the routine used, it is important to be consistent in an orderly and calm fashion.

The first step in good milking management is to provide an environment for the cows so that their udders and teats remain relatively clean at all times. Stalls and walkways need to be maintained. Udder hair should be clipped or singed on a routine basis. If cows are kept clean, water can be eliminated from the cow prep routine.

The following cow prep routine was developed at the University of Minnesota and was shown to reduce bacteria counts and reduce milking machine on time compared to more traditional methods:

1. Teats are pre-dipped or pre-dip spray is used (*Figure 1*). Three vertical motions up and down the teat and a couple of motions across the teat end are made with the milker's hand. This removes dirt, gets teat dip into the crevices of the teat and stimulates milk letdown. For sanitation reasons, it is preferable for the milker to wear plastic gloves.



Figure 1

2. Two streams of foremilk are removed from each quarter. This step aids in detection of clinical mastitis, flushes bacteria from the teat canal, further promotes milk letdown, increases milk output and speeds milking time. In

parlors, the stream of milk may be directed onto a black patch on the floor and later washed away. Strip cups must be used in stall barns (*Figure 2*). Make sure it is kept clean, as a dirty cup is a perfect haven for bacteria. The disadvantages of fore-stripping include increased labor and a possibility of the development of tendonitis in some workers.



Figure 2

3. Re-dip or spray the teat. Allow at least 30 seconds of contact time before Step 4.
4. Wipe off the teat dip with a single-service towel - paper or cloth (*Figure 3*). Attach the milking unit and position the claw to prevent liner slip.



Figure 3

The above steps represent an ideal situation and the more religiously they are followed the better the results would be expected. Variations, within reason, can be adopted and still

Producing Quality Milk

have acceptable results depending upon the circumstances in the herd. However, just pre-dipping grossly dirty teats and then just wiping them off prior to machine attachment is not acceptable. Nor is the use of a common rag or sponge to wash cows, or attaching units to wet or dirty teats.

If automatic detachers are not used, remove the machine when milk flow has stopped, as determined by watching milk flow in the transparent claw or appearance and feel of the udder. Do not pinch the milk tube to detect milk flow. The constriction can force mastitis organisms into the teat. Remove the machine by shutting off the vacuum and then catch the claw as it falls.

Machine stripping, where pressure is applied to the claw in a downward direction and the udder massaged, should not be necessary (*Figure 4*). Today's narrow bore liners and improved liner design minimize teat cup crawl and generally eliminate the need to strip. Use machine stripping only on cows that have problems due to injury, udder shape, mastitis or edema. Routine machine stripping increases labor and milking time without significantly increasing milk yield.



Figure 4

The following table gives guidelines as to how long the milking unit should be on the cow:

Production (lbs/day)	Average Milking Time (minutes/milking)	
	<u>2x</u>	<u>3x</u>
50	6.5	5.6
75	8.0	6.5
100	9.4	7.5

If milking times are longer than this, the entire milking procedure should be evaluated to determine the cause.

Completeness of milking can be determined by hand-stripping a random ten cows into a bucket. If the strip averages more than 1 lb. per cow, incomplete milking is occurring. Typically, strip yields should be less than .5 lb. per cow. Incomplete milking can be caused by many different problems. Common causes are: improper vacuum levels, poor type or condition of liners, clusters that are too light or hang unevenly, poor oxytocin stimulation and partial closure of short milk tube due to claw inlet size too large compared to tube size.

Within minutes of machine removal, dip the teats to cover at least the bottom 50% of the teat in an approved teat dip preparation (*Figure 5*). The solution must be clean to be effective. Discard teat dip contaminated with manure or urine, and rinse the cup before dipping the next cow. Discard any teat dip remaining in the cup at the end of milking and wash the applicator regularly.



Figure 5

Finally, be as calm and quiet as possible around the cows, especially during milking. When cows are excited or treated roughly, adrenalin from the adrenal gland will suppress the effects of oxytocin and good milk letdown is not achieved.

Clipping Cows

Clipping excessive hair from cows in late fall and winter serves several purposes. Clipped cows stay cleaner, which reduces prep time. Bulk tank bacteria count and sediment are reduced by up to 50%. Mastitis infection may be decreased because of reduced exposure to pathogens. Clipping is also a good lice control measure.

Equipment needed for clipping a cow includes the clippers, one or two sets of spare blades, a screwdriver for clipper adjustment, diesel fuel or similar lubricant, curry comb and brush (*Figure 1*). You may need a halter or other restraining device as well.



Figure 1

The area that needs to be clipped varies with individual cows and the environment they're in. Minimal clipping should include the cow's udder (*Figure 2*), along with the legs and thigh from the hock up to about 12 inches from the tailhead. In most cases it is worthwhile to clip a larger area, if time allows, as illustrated in *Figure 3*.



Figure 2

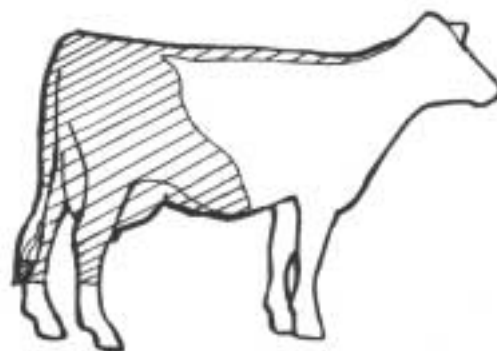


Figure 3

If clipping a number of cows, it's best to get a routine down. For example:

- Approach the cow from the side so she sees you, and begin clipping the tail.
- Cut off the switch to within 4 inches of the tailbone, or 1 ft. from the floor. Clip the tail starting a few inches above the switch and continue up over the tailhead.
- Clip the udder against the hair. Use your free hand to pull the folds out of the skin (*Figure 4*).



Figure 4

- Clip the legs and thighs and continue up over the rump. The belly should be clipped from the milkwells back.
- Four strokes down the topline to the poll will help prevent lice.

Long-haired springers brought into a warm barn from an outside lot will adjust to the temperature change faster if given a complete body clip.

Calves will also benefit from a small trim job. Clip the tail from the switch to the tailhead, and clip a small patch under

the tail (*Figure 5*). This will prevent manure from accumulating on the tail, which can restrict blood flow. If not removed, these manure balls can result in loss of the tail.



Figure 5

Clippers and blades are relatively expensive, but proper care and maintenance will insure a long life:

1. Keep blades sharp. Dull blades irritate the cow, overload the clipper motor and make clipping an unpleasant task.
2. Clean extremely dirty cows before clipping. Plowing through packed manure will dull blades. Sharpen dull blades.
3. Submerge the clipper head into diesel fuel while running, to lubricate the blades and flush out dirt and hair. Do this periodically as you're clipping the cow. The clipper should not run hot. Submersing the clipper head is preferable over using a spray lube.
4. Wipe the hair off the motor screen as you clip.
5. Turn down the tension screw just enough to get the blades to cut. Too much tension will wear blades and overheat the motor. The tension screw might tighten as you clip. Check it periodically to make sure it isn't tighter than need be.
6. If the clipper blades are bumped against a hard surface, teeth can break. Discard and replace blades rather than try to get additional use from them.
7. Maintain the clippers routinely, depending on amount of use. Oil the bearings through the holes in the case. The bearings are wick-fed. Do not remove the wicks. Periodically, add a small amount of grease to the gears inside of the clipper head as needed. Dry gears will make a rattling or clanking sound.

8. Don't store clippers in the barn or other damp area. Clean and oil clippers before storage. Store in a dry, dust-free area with the motor resting higher than the head to prevent oil from seeping back into the motor.

Singeing Hair Off the Udder

A fast, easy way to get the hair off of the udder is to singe it off using a modified propane torch. The air vents need to be blocked and a flange can be placed on the nozzle to broaden the flame (*Figure 6*). The flame should be orange not blue when lit.



Figure 6

A wand type torch can be constructed from 36" of heavy duty brake line, some fuel line tubing, hose barbs, and a ball type gas shut-off valve. These materials can be found in hardware and auto stores. Squeeze one end of the brakeline closed and drill 6-8 1/16" holes about 1/2" apart starting at the crimped end. The other end is attached to the gas shut off valve which is attached to the rubber tubing running to a modified torch attachment screwed onto a 14 oz propane bottle. The bottle can then be hung from your belt. The brakeline can be bent to the most convenient shape to singe the udder. Make sure all connections are leak free. Larger herds may wish to use a BBQ sized propane tank rather than the small propane bottle.

The hair is removed around the teats and udder floor by circling the flame around the bottom of the udder. It may take several passes depending on the density of the hair. Keep the hot nozzle away from the teats and keep the flame moving. Keep your hand or stick with a pad on near the udder to rub out the flames if the hair catches on fire. Because some cows may object to this procedure, for added safety and efficiency, it is best to have someone restrain the cow with a tail hold. The area should be ventilated but a draft will blow out the flame.

The biggest advantage of singeing is the speed. A hundred cows can be done in less than an hour. With this efficiency, herds can be done every 2-3 months. If cows are done often the job is easier as there will be less flame-ups. This job should be assigned to a competent, well trained individual as there has been reported cases of cows' teats being severely burnt from improper use of this procedure.

Milking Equipment Maintenance

Even the best milking equipment needs routine maintenance. The system should be serviced at least once every 6 months by a competent service technician. In addition, the operator needs to make routine inspections to avoid costly repairs of equipment or injuries to mammary tissue.

During each milking, check the vacuum gauge to ensure that proper vacuum is being maintained (*Figure 1*). The vacuum is usually set at 12-13 inches of mercury for low pipelines, 14-15 inches for high lines. Vacuum level should not fluctuate more than 1/2 inch during milking. Excessive fluctuation indicates problems with the regulator or other inadequacies. Keep the gauge clean, and check it for accuracy each time the system is serviced. Gauges lose their accuracy after several years due to corrosion and need to be replaced. Do not adjust vacuum levels without first checking the accuracy of the gauge!



Figure 1

Clean the vacuum controller or regulator at least monthly, or according to manufacturer's directions. *Figure 2* shows a weighted style regulator that has been poorly maintained. Frequency of cleaning is determined by how much dust and grime the regulator is exposed to. One way to check if a regulator is sticky or faulty is to open a milk inlet halfway. Vacuum should hold within 1/2 inch of the original level. Next, open it all the way and then close it. As the vacuum level returns to normal, it should not go past the set position. Newer diaphragm controllers are superior in maintaining a stable vacuum than the older, weighted style regulators. Old style regulators need to be replaced.



Figure 2

Service the pump as directed by the service manual. Check oil level or usage, belt tension and alignment every 2 weeks (*Figure 3*). Always use a vacuum pump oil recommended by the manufacturer. Using a substitute oil may void the pump warranty or cause it to fail. Turn pump by hand to detect unusual drag, loose pulleys or rough bearings.



Figure 3

A pulsation rate between 50-60 is generally recommended. This may vary slightly with manufacturers. Pulsators need to be cleaned and serviced regularly to ensure proper functioning (*Figure 4*). A pulsator that sounds sluggish or unusual should be fixed or replaced immediately. A spare pulsator kept on hand for emergencies is cheap insurance.

A couple of quick, easy procedures can determine if there is adequate vacuum capacity in the system. Set up the milking system as during milking. In a 4-unit system, admit air by turning over 1 unit - similar to what would happen if a unit

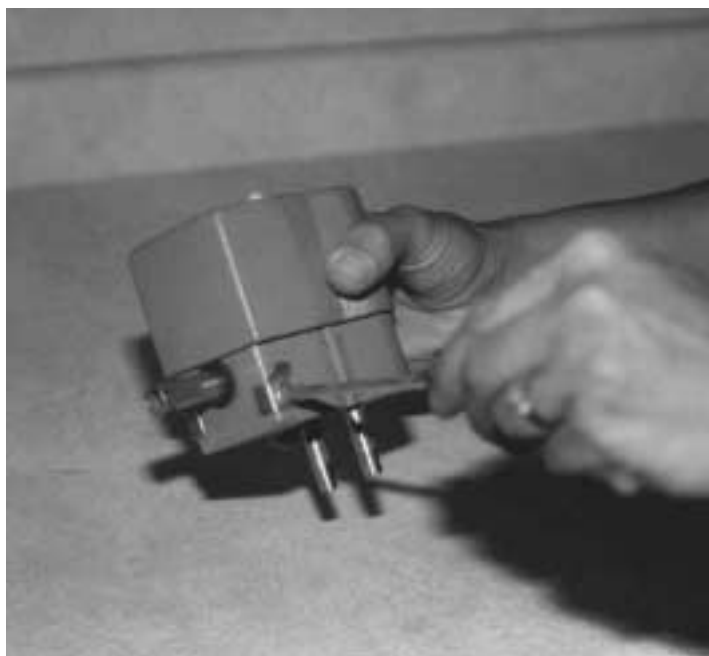


Figure 4

fell off during milking. The vacuum level should remain within 1/2 inch of mercury. Rather than turning over a unit, an alternate test is to open a milk inlet for 5 seconds and then close it. The vacuum in the line will drop but should recover in 3 seconds or less. An extended recovery time may be caused by problems with the pump or regulator, under-sized lines or leaks in the system. To detect a leak, hold plastic wrap over the suspected area. If a leak is present, the plastic will be sucked to the hole.

Milk lines must be of adequate size, slope and design. The following table provides guidelines to prevent flooding. These guidelines are also influenced by how fast units are attached and milk flow per cow. A pipeline's effective size is reduced if there are restrictions anywhere along it. Many times, restrictions are found at the receiver jar (Figure 5) because of improper design. In this illustration, the black plug cuts the effective size of the pipeline in half and should be replaced with a more efficient design.



Figure 5

Parlor with looped line, units per slope*

line size	Slope (percent)					
	0.5	0.8	1.0	1.25	1.5	2.0
2-inch	2	3	3	4	4	5
2.5-inch	4	5	6	7	8	10
3-inch	6	9	10	13	16	24
4-inch	21	28	32	35	38	43

Clean air vents in the claws when they become obscured during milking. If vented inflations are used, the air vent in the claw should be plugged. Vented equipment should move milk away from the cow faster, but also requires more air flow. Make sure that there is adequate vacuum reserve before changing to vented equipment.

Inspect hoses and tubes regularly for obvious wear, cracks, kinking, distortion or swelling. This is especially important for the pulsation hose and short milk tube. Replace hoses on a regular basis before they start causing problems.

Conscientious attention to machine maintenance will help achieve maximum milking efficiency. The operator needs to be aware of the importance of regular inspection, follow manufacturer's recommendations and consult with an expert if any problems arise.

Proper Use and Care of Inflations

Inflations, or teat cup liners, relieve vacuum to the teat and massage the teat as they collapse during the pulsation cycle. Teat-end irritation and high somatic cell counts can result from inflations that are worn, misused or not properly selected for the milking system. In addition, six fold differences in strip yield, eight-fold differences in the incidence of teatcup slips, and 33% differences in milking times between liner types have been reported.

There are many different types of liners on the market. Narrow bore liners are less prone to damage teat and udder tissue, and are preferred over inflations with more than 7/8 inch inside diameter (*Figure 1*). The internal diameter of a liner is usually measured 3 inches below the top. Ideally, liners should have an internal diameter about 1-2 mm less than the average diameter of the teats after milk letdown.



Figure 1

Liners should be long enough to collapse below the teat. If the liners are unable to collapse because there is not enough liner past the teat end, the teat end is exposed to constant vacuum and will be damaged. The minimum lengths of the liner barrel should be: 5.1" for liners up to .8 inch diameter; 5.3" for liners .82" to .88"; and 5.5" for liners over .90" to .94".

Liners are basically of two designs: molded or multiple piece. There are advantages and disadvantages for each. The advantage of a molded inflation is reduced labor required for cleaning and changing the inflations. Multiple piece design allows an air vent above the short milk tube, which may help prevent teat cup flooding. Liners may be made from natural rubber, synthetic rubber, a combination of the two, or silicon.

There is no "best" inflation. In fact, most suppliers handle a variety of liners. The inflation that works best in a given sit-

uation may depend upon milking system design, vacuum level, udder conformation and personal preferences. Because of their design differences, there are inflation differences in milking speed, completeness of milkout, amount of liner slips, and fall-offs. If the rest of the milking system checks out and any of these problems persist, changing inflation types may help. However, changing inflation type will not compensate for deficiencies in the overall system and will seldom cure a mastitis problem.

Probably the biggest abuse of liners is that they are used too long. Follow the manufacturer's recommendations. Generally, rubber inflations can be used for 600 cow milkings, synthetic rubber for 1,200 cow milkings, and silicon inflations for about 5,000 cow milkings. For example, a 60-cow herd is milked with 4 units. Each unit milks 15 cows per milking, or 30 per day. If natural rubber inflations are used, you would expect to change them every 20 days. Synthetic rubber would be changed every 40 days in this example.

Examine liners regularly and discard any that show signs of roughness or wear. Change all 4 inflations on a unit at the same time, because mixing new and old inflations can lead to uneven milk-out.

Liners should be checked daily to make sure they are not twisted in the shell. Many liners have markings to insure proper alignment (*Figure 2*). A twisted liner may cause incomplete milking and may increase dropoff problems.



Figure 2

Water should not get between the liner and the shell. This may result in slow, incomplete milking. It is recommended to check for water between shell and liner before each milking. Just one teaspoon of water can cause the inflation to malfunction.

Producing Quality Milk

To avoid a buildup of organic materials such as milk fat, protein and sugar, never allow milk to dry in the liners. Immediately rinse liners with cool water after milking, then wash and rinse again. Natural rubber liners tend to be more porous, and absorb milk solids more easily. To extend their usefulness, boil them in a lye solution for 1 hour weekly and soak overnight (*Figure 3*). It may pay to have 2 sets if stretch liners are used. By alternating your sets every 7-10 days - one set in use and the other soaking in solution - you can lengthen the useful life of the liners and help maintain flexibility.



Figure 3

Other considerations:

1. Make sure the liner fits the shell. When collapsed, the liners should still move freely within the shell. The inflation's diameter when flattened should not exceed the diameter of the shell as noted in *Figure 4*. The mouthpiece should not be distorted by a shell diameter that is too big, but the shell needs to be large enough to hold the mouthpiece firmly to avoid twisting.



Figure 4

2. Store liners away from electric motors and sunlight. Ozone from the electric motors can cause the rubber to crack. Sunlight shortens the liner's life.
3. Some manufacturers recommend that inflations be taken out of the shell for manual cleaning or at least removed once a week to allow the rubber to relax. Inflations should be pushed out rather than pulled. Twist the milk tube clockwise, then push to remove the inflation correctly.
4. Ointments and teat dips may cause deterioration, so check liners often. You may need to change ointments or teat dips if fast deterioration is noted.
5. Liner life varies with how they are stored, used, and cleaned. Adjust the manufacturers suggested replacement rate accordingly. If there is a significant change in milkability when liners are replaced, the liners were used too long.
6. When switching from a stiff to a more pliable liner, such as silicon, milking time may increase. This happens because the more pliable liners may close sooner and open later during the pulsation cycle. If milking speed remains greatly decreased after a 2-week adjustment period, then the pulsation ratio of the unit may need to be changed to achieve the same milking speed as with the stiffer liners. Softer, more pliable liners generally are preferred for good udder health.

You need to do everything possible to promote good udder health and produce a quality product. Proper selection, care and use of inflations is important in reducing teat irritation and somatic cell counts.

Detecting and Treating Mastitis

A total mastitis control program is needed to minimize mastitis. However, even in the best managed herds, mastitis flare-ups occur occasionally. Timely diagnosis of clinical and subclinical mastitis and proper treatment are key elements in the fight against this disease.

Observe and palpate the udder to detect clinical mastitis. Quarters that become hot or swollen are suspect, and examination of the milk may confirm a clinical mastitis flare-up (*Figure 1*). Flakes, clots or garget can be seen in the milk from clinical quarters. Treat these cows promptly.



Figure 1

For every clinical case, there are 15-40 subclinical cases in a herd. Although milk from subclinical mastitis appears normal, yield is reduced significantly. In addition, most clinical mastitis develops from subclinical cases, and subclinically infected cows serve as bacteria reservoirs to infect other cows. Subclinical infections can be detected by an elevated somatic cell count.

Somatic Cell Count should be monitored through the DHIA SCC option. In addition, the California Mastitis Test (CMT) is a fast, efficient screening test for individual quarters. Mix 1 or 2 streams of milk from each quarter with an equivalent amount of reagent in the 4-compartment CMT paddle (*Figure 2*). The reagent causes the membranes of the somatic cells to rupture and a gel to form. The more gel, the higher the cell count.

Generally, it is not effective to treat cows with elevated counts unless they show symptoms of clinical mastitis. However, knowing the cell counts of individual cows will help monitor incidence of mastitis, important in a mastitis control program.



Figure 2

Culturing a milk sample to identify the microorganism involved will help prescribe the correct treatment (see page 101). It is extremely important to maintain sanitary conditions to obtain a useful sample. Wash your hands before sampling. Be careful not to contaminate the container or its cap. To obtain the sample, wash and dry the udder and teats as you would if prepping the cow for milking. Remove three streams of milk from each teat. Soak a clean cotton ball in 70 percent rubbing alcohol and swab off the teat end. If multiple quarters are being sampled, start with the far teat so that you don't contaminate a clean teat with your arm. Hold the tube at a 45 degree angle and squirt the milk sideways into the container. Then fill the container provided by your veterinarian (*Figure 3*). Refrigerate samples immediately at 34-40°F and culture within 24 hours, or freeze until delivery to the lab.



Figure 3

Producing Quality Milk

When infusing a cow with an antibiotic, make sure you follow these simple rules. Dip the teats with a teat dip. Allow 30-60 seconds contact time then dry with a clean towel. Swab the teat end with cotton saturated in alcohol, or use the pad provided with the antibiotic product. Be careful not to contaminate the cannula of the syringe as you insert it into the teat canal (*Figure 4*). The cannula should only be inserted about 1/8 inch or just deep enough to deliver the antibiotic into the teat. Depress the plunger slowly and remove the syringe. Massage the quarter to distribute the antibiotic, and re-dip the teats.



Figure 4

Use only single-dose syringes and products designed for udder infusion. The few cents saved by using multiple dose containers or homemade mixtures is not worth the risk of introducing pathogens into the udder.

Make it standard practice to mark the cow and record the treatment. Marking methods include paint stick, marker, paint spray on the rear leg, or a leg band (*Figure 5*). Don't take a chance. Mark the cow on both sides in parlors where they can be milked from the left or right. Develop a system that works and is understood by everyone milking, so contaminated milk does not enter the bulk tank.



Figure 5

Even if a cow is treated in only 1 quarter, milk from all 4 quarters must be discarded for the length of time prescribed on the label. If antibiotic milk is fed to calves, they must be withheld from market until the antibiotic clears their tissues. This also applies to calves fed colostrum from dry treated cows.

Wishing to avoid antibiotic use and residue problems, alternative methods to treat clinic mastitis have been sought. For mild cases of mastitis, giving an injection of oxytocin during milking and milking frequently during the day may allow many cows to cure themselves. Work with your veterinarian to develop a treatment plan and recording scheme for your dairy. An example plan is given on page 100.

Good management is essential to diagnose and properly treat mastitis, and prevent antibiotic residues in human food products. Good records and communication with your veterinarian are also essential in a total mastitis control program. Finally, clinical mastitis can be reduced significantly in the future by wise selection of A. I. sires today. Bulls with low PTA's for SCS have daughters with significantly lower incidences of mastitis.

Farm: _____

Date: _____

Veterinarian: _____

Guidelines for Clinical Mastitis Treatment					
Severity	Symptoms	Type of infection	General treatment plan		Specific drugs/doses
Mild	Abnormal milk		1-3 cc oxytocin, milkout		
Moderate	Abnormal milk Swollen quarters		1-3 cc oxytocin, milkout 1 st episode, then Rx IMM If 2 or more episodes, chronic, antibiotics are often ineffective		
Severe	Temp > 102° Abnormal milk Swollen quarters Severely ill, depressed, off-feed and dehydrated		1-3 cc oxytocin, milkout Antipyretics (Aspirin, Banamine, etc.) and anti-inflammatory. Antibiotic IMM and/or systemic IV. Fluids as needed		
			Withholding		
Drug used	Dose		Milk (hrs)	Meat (days)	Appropriate test

Further Instructions

- (1) _____
- (2) _____
- (3) _____

Organisms That Cause Mastitis				
Bacteria	Source	Persistence	Subclinical* Treatment	Control Measures**
Strep. ag.	infected udders	chronic	eradicated by antibiotics	antibiotic treatment
Staph aureus	infected udders, contaminated bedding, teat sores	chronic	not recommended	segregate or cull infected cows, check milking equipment
Environment. strep. (Strep uberus, Strep dysgalactia, Strep bovis)	environment	self-limiting, occasionally chronic	treatment not recommended	improve barn, lot, and stall sanitation, check milking equipment, avoid liner slips
Staph epidermitis	common on skin	sporadic and self-limiting	do not treat	not necessary because of low pathogenicity
E. coli (coliform)	environment, cow feces, contaminated water	cow dies or infection eliminated	seldom subclinical, no treatment for subclinical	barn and lot sanitation, especially during hot-humid weather, avoid liner slips, avoid letting cows lay in contaminated area after milking
Klebsiella (coliform)	environment-often in sawdust bedding	variable	chronics difficult to treat	keep sawdust fresh and dry if used (same as for E. coli)
Yeast	contaminated antibiotics or syringe used to infuse udder	self-limiting	no treatment	use sterile equipment for intramammary therapy, avoid homemade mixtures
Mycoplasma	infected udders	becomes chronic	no treatment	culture cows, segregate or cull infected cow
<p>*Clinical cases should be treated according to treatment criteria for individual farms.</p> <p>**Teat dipping after milking and dry treatment are recommended for all herds. Organisms may be spread from infected to uninfected quarters by contaminated milking units or milker's hands. Damaged teat-ends greatly increases cow's susceptibility.</p>				

Sampling Forages

Dairy rations are generally balanced nutritionally by adding concentrates to complement nutrients supplied by forage. The surest way of accurately determining nutrient content of forage is through a well-planned feed analysis program. Frequent and proper sampling is important.

The analysis of feed is only as good as the sample. When sampling hay, keep the different fields and cuttings separate. Using a bale corer is essential for a good hay sample (*Figure 1*). The best sample is obtained if the corer is put in at an angle in the end of the bale. Hay corers are available from many farm supply outlets. They can be manually turned into the bale or mounted on an electric drill.



Figure 1

Sample a minimum of 12-15 bales from the same lot. Pick bales randomly for the best estimation of hay quality. Don't hand pick the best appearing bales for sampling!

Mix the 12-15 cores together to get a composite sample. Testing labs generally need about 1 lb. (1-2 quarts) of material to run the analysis. Avoid grabbing a majority of stems or fines for the composite sample.

By mixing the cores on the top of a table and then pushing a portion into a bag, an adequate sample should be obtained (*Figure 2*).

Figure 3 shows a labeled plastic bag with a paper label inside for identification. Labels should include your name, address, sample number, forage mixture, stage of maturity and date harvested. Store in the freezer if the sample will not be sent to the lab right away.

Sample haylage and silage as the silo is being filled. In a pail, collect 4-5 handfuls from the first load and from every



Figure 2



Figure 3

second or third load after that from each field. Again, get a good composite sample in a 1 to 2-quart airtight plastic bag and put the container in the freezer to prevent spoilage. Send the sample to the lab early in the week, so the analysis is run before the weekend. The label should indicate that the sample was taken prior to fermentation.

By sampling feed as it's going into the silo, you can get results from the lab and balance the ration before the feed is fed. When fields or feed changes, mark the spot in the silo by throwing a few small pieces of black or colored plastic into the blower. *Figure 4* shows the plastic in corn silage coming out of the silo.

If forage is ensiled too dry, heat damage may occur. The sweet-smelling, dark brown material is very palatable to cows, but much of the protein may be indigestible. This feed needs to be tested for available crude protein, and rations adjusted accordingly. Test corn silage for crude protein after



Figure 4

fermentation if urea or anhydrous ammonia is added at ensiling. Indicate on the label the additive used.

The moisture content of a sample will be included on the lab report. However, it can fluctuate quite a bit in different depths of the silo, and should be retested and rations adjusted accordingly. *Figure 5* shows the equipment needed to test for moisture content: a small scale and microwave oven.



Figure 5

A simple method is to weigh 100 gm. of material on a plate or dish that is microwave oven-safe. Make sure you deduct the weight of the plate. Arrange the material on the plate with a hole in the center. Place the material into the center of the oven for 6 minutes for haylage or silage, 2 minutes for hay. Mix haylage and silage samples every 2 minutes to ensure uniform drying. Remove from the oven and reweigh. Place in the oven for another 2 minutes and reweigh. If the weight changed little from the previous weighing, the sample is dry. If charring occurs, the sample is overcooked, so use the previous weight to calculate moisture content.

If you started with an initial weight of 100 gm. and the dry weight is 40 gm., then the percent dry matter is 40% and percent moisture is 60%. Besides helping to balance the ration, this method of determining moisture content can also help determine when hay is dry enough to bale or of proper moisture to ensile.

The microwave method usually can be completed in 10 to 15 minutes but can take up to 30 to 45 minutes for high-moisture feeds. Electronic moisture testers are available that require about 4 minutes per sample. A Koster Tester requires 15 to 40 minutes, but the operator does not have to be present while the test is run.

Quick test of moisture in the field: Keep a roll of paper towels in the tractor. After chopping a small amount, put a pool ball-size ball in a towel and squeeze. If there is lots of free liquid it is too wet. If there is just a few stains it is too dry. The amount of staining will depend on the crop, how hard you squeeze, and fineness of chop. By comparing the amount of staining to moisture content determined by a different method, you can “calibrate” this test for your conditions.

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