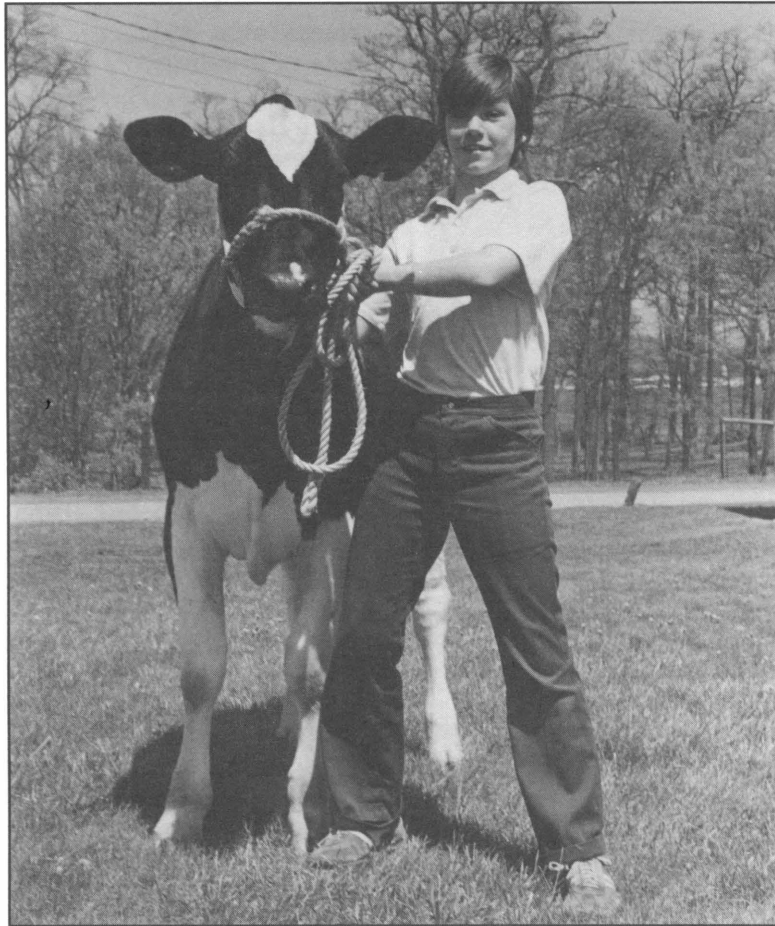


4-H Dairy Project 1



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4-H DAIRY PROJECT I

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ACKNOWLEDGEMENT

The author acknowledges the following 4-H members and leaders who posed for pictures included in the bulletin. Evan Heald, Marc Van Pelt, Mr. Edwin Van Pelt, Sandy Davis, Michelle Johnston, Amanda Lohr, Gaye Lohr, Melanie Johnston, Rhonda Johnston, and Roy Banks.

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Issued in furtherance of Cooperative Extension work. Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. James F. Johnson, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; Clinton V. Turner, Administrator, 1890 Extension Program, Virginia State, Petersburg.

LESSON 1: SELECTING A PROJECT CALF

Your Responsibility as a 4-H Dairy Member

A 4-H calf project will give you an opportunity to learn much about dairy cattle and the dairy industry. You will enjoy many of the activities related to the project. There will likely be Christmas parties, wiener roasts, scavenger hunts, dairy judging meetings, fitting and showmanship clinics, demonstrations to give, work parties, and many more experiences that you will remember for a lifetime. To have a good 4-H club experience will depend upon you, and how much you put into it. This means you should attend your 4-H club meetings regularly, do your part to make them interesting, make friends with other members, and, of course, do a good job of rearing your calf.

Selecting a Calf

The selection of a calf will be one of the most important decisions you will have to make. A 4-H member, just as a dairyman, should use the tools that are available to help him or her make wise decisions. Scientists continue to provide new and more sophisticated tools. For example, we are able to use computers instead of hand methods to make many of the mathematical calculations that are necessary to good decision-making.

What Kind of Calf to Buy

The major dairy cattle breeds are Ayrshire, Brown Swiss, Guernsey, Jersey, and Holstein. The breed you select does not matter; each breed has good animals and poor animals. You should select the breed you prefer. This may be a breed different than what your parents have. If this is the situation, it may require separation from other heifers if they are pasture bred; however, this difference can be competitive fun if you and your parents have the right attitude. A different breed does have the advantage of easy identification; this is especially important for boys and girls who need some encouragement and whose father has a very large herd.

Registered or Grade

If possible, select a registered animal because you can show it at the county fair. Showing at the county fair can be a lot of fun for you and your parents. Participation in fairs and shows provides opportunities for developing long-lasting friendships and happy memories to be shared for a lifetime.

Registered calves cost more than grades but are usually more valuable when they mature. Likewise, if the calf grows into a good cow, she

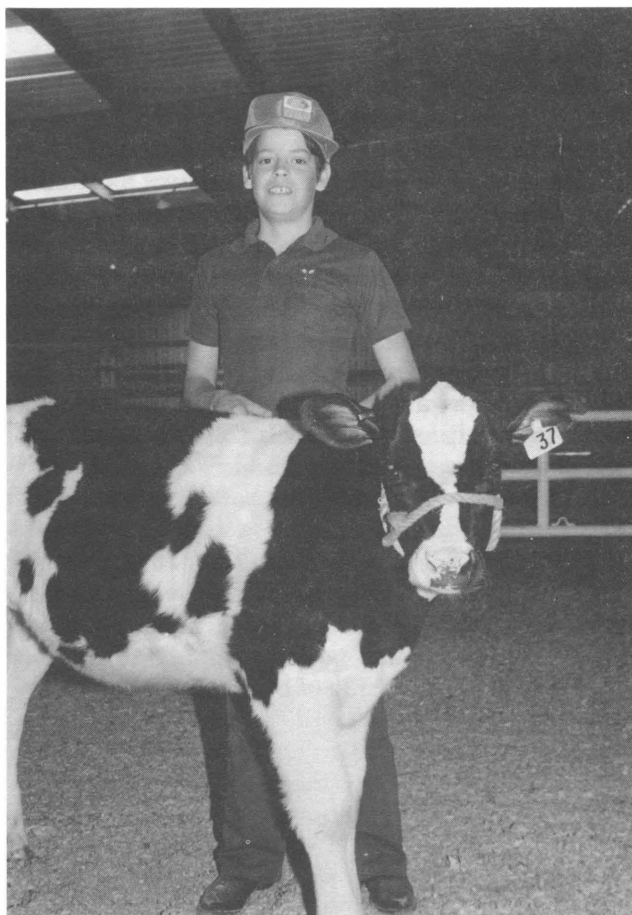


Figure 1. Buying a calf can be very exciting.

may become a foundation animal from which to build a registered herd. It costs no more to rear a registered calf than it does to rear a grade animal.

Unfortunately, not all registered calves become profitable cows. A top quality grade heifer is a better investment than a "just average" purebred. Be sure to select a *good* registered calf.

Where to Buy

If your parents have a good herd, this may be the best place to get your calf. They know the good and bad characteristics of each family in the herd and will be glad to help you select a calf.

If your neighbors have good herds, they will probably be happy to help you get a good start. Rely heavily upon the judgement of breeders because they are more likely than you to know which calves will make good cows.

If you do not know of any herds in your community from which to select a calf, ask your local 4-H club agent. He or she will know farmers who have good cattle. Any member or officer of

your county or state dairy breed association will also be helpful in locating a good calf.

At What Age

It is usually best to buy a calf that is from three to six months old; by then it is well started and less susceptible to disease. Calves born after January 1 of this year may be shown as junior calves this summer, calves born between October 1 and December 31 of last year may be shown as intermediate calves, and those born between July 1 and September 30 of last year may be shown as senior calves. The older and larger calves usually place higher in their classes at the fair. Therefore, if possible, select a calf that was born in January, October, or July or the month following each of these months.

What to Consider

The herd from which you select your calf should be on DHI (dairy herd improvement) test and have a rolling annual herd average of at least fifteen thousand pounds of milk and five hundred and fifty pounds of butterfat. A calf from a high-producing herd will not cost very much more than one from a mediocre herd, and may not be much more difficult to locate. Select a calf from a cow that ranks in the top one-third of the herd. This means that the cow will probably have an ME (mature equivalent) record of around seventeen thousand pounds of milk. The owner should tell you how he would rank his cows and permit examination of his records.

The calf should be sired by a bull that has an A.I. (artificial insemination) proof of at least 1000 pounds of milk superiority, more commonly called PDM (predicted difference milk). It is the best estimate of the production of future mature daughters compared to breed average herdmates. It is important to select calves sired by proven bulls rather than unproven "clean-up" bulls, or so-called "popular" bulls. The popular bull may only have a popular pedigree or be a show ring winner. He may become outstanding but is now unproven. This risk should not be taken.

All cows on test that have completed a first lactation record will have a USDA cow index rating. It will appear on the individual heifer calf page of DHI-204, and on the cow page of DHI-203. The cow index is an estimate of her genetic transmitting ability for producing milk. It might be more clearly understood as the same as the PDM for bulls. The cow index rating for the dam of your project calf should be six hundred pounds of milk or higher.

The individual heifer calf page will also show the calf's ETA (estimated transmitting ability). This is an estimate of her genetic ability for milk production. It should be about eight hundred pounds. The calf's ETA is calculated by taking one-half of the PDM of the sire and one-half of the cow index value. For example, the eight hundred pound figure is derived by taking one-half of a 1000-pound PDM sire (500 pounds) and one-half of a six hundred pound cow index rating (300 pounds), and adding the two figures which total 800 pounds. The PDM of a sire changes with the production of his daughters, and the USDA cow index value changes with her yearly production. Use the latest Sire Summary available from your local Extension Service or A.I. stud book, and the USDA cow index reported on the cow page of DHI-203, to calculate the ETA of the calf in question. This is not nearly so complicated as it may sound. Merely reread the above paragraph and collect the PDM and cow index value.

The best single guide for selecting a calf is the PDM of the sire. For example, if a bull has one hundred daughters that average fifteen thousand pounds of milk, the best estimate is that his next daughter will also produce at about this level.

What about the PDT (predicted difference for type) of the sire and type classification score of the dam? PDT of the sire is the expected difference in final classification score between his daughters and the breed average. The PDT of the sire should be plus, preferably in the range of one percentage point or more. This means that his daughters will be more correct in type than the breed average. The dam should be classified "Good Plus" or higher, perhaps "Very Good".

Most 4-H members would like their calves to win a blue ribbon at the county fair. This is an admirable goal, but it does not justify getting a calf just for showing. Many so-called "show calves" of varying quality are seen at county fairs and very few mature to be "show cows" because, following freshening, their udders are not acceptable. Many of the udders lack strength of fore and rear attachment. In many instances, such show calves were selected at six or eight months of age when they appeared very correct in type, showing a straight top, straight legs, and sharp withers.

For your project to be really successful, your calf must develop into a reasonably good milk producer. Select a calf for milk production and hope that she may win a blue ribbon; do not select a calf to win a blue ribbon, hoping that she will be a good producer.

LESSON 2: DIFFERENT METHODS OF FEEDING CALVES

Feeding and caring for your calf will be fun. She will learn quickly that you are her friend and will respond to your good care. The way that you feed and care for her will depend on her age. Let us suppose that you will be receiving a new-born calf from your father.

Care of the Cow at Calving

The cow should be isolated from the cows in the dry-cow lot several days before her expected due date. Place her in a clean pasture near the barn during good weather so that she can be observed regularly. Provide a clean, well-bedded stall during adverse weather. A clean pasture is usually best as it will harbor less disease-causing organisms than most box stalls.

Signs of approaching calving (two to twelve hours) are: enlarging of the vulva, relaxing of the muscles and ligaments near the tail head, appearance of colostrum on the teat ends, and unrest of the cow.

A healthy cow will usually give birth without assistance, however you should be present at calving time is possible. After the cow lies down, she should be left alone so that normal dilation can take place. This may be one or two hours. If the birth is not progressing normally after two hours, the cow may need assistance to prevent death of the calf and injury to the cow. Should you need to enter the cow to assist her, be sure to clean your hands and arms with soap and water and use a plastic sleeve. Use warm water and a disinfectant such as Nolvasan surgical scrub, Weldol, or Lubrivet to clean the vulva and surrounding area, and rinse thoroughly.

Danger signals at calving are: unproductive labor of two to three hours, the appearance of the calf's front feet without the head, the appearance of the tail or head with no feet showing, or only one foot showing.

Once the calf is born, get the calf breathing as soon as possible. Clean the mucous from the mouth and nose. Before doing this make sure your hands are clean. Dip the calf's navel cord in tincture of iodine to seal this entrance from disease organisms.

Colostrum Milk

The feeding of colostrum milk soon after birth is probably the most important single point for the success of calf rearing. Feed one or two quarts within the first thirty minutes after birth. Many farmers feed colostrum from a pail or nipple bottle so they know how much colostrum the calf has consumed. If you allow the calf to

nurse the cow, you do not know how much colostrum it has taken.

Colostrum contains antibodies, also called gamma globulins, which provide the calf with immunity to disease. The calf is born with no immunity to diseases and therefore early feeding is important. At birth, the calf's intestinal wall can absorb the antibodies and allow their entrance into the blood stream, thus providing protection. This absorptive efficiency decreases quite rapidly, and at twenty-four hours of age virtually no antibodies can be absorbed. The colostrum likewise decreases rapidly in its concentration of antibodies soon after birth of the calf. At the time of birth, a race exists between the disease organisms present in the environment where the calf is born and the antibodies in the colostrum milk. Whichever is ingested first by the calf has a tremendous advantage in controlling its general health. This is why a clean environment is needed at the time of calving.



Figure 2. It is very important for baby calves to receive colostrum milk within 20 to 30 minutes after birth. It is also important to clean the teats of manure or dirt before nursing. If disease causing organisms enter the digestive tract before the colostrum milk, the calf may become sick.

Other properties of colostrum important for a new born calf are: a high percentage of butterfat, protein, and vitamin A. It may be useful to have colostrum milk on hand for an emergency; therefore, save some from a cow that has more than is needed. The colostrum of older cows is more concentrated than that from first-calf heifers. You may find it useful to freeze the colostrum in two-quart milk cartons.

Whole-Milk Feeding Schedule

A rule of thumb is to feed about 8% of the calf's weight in pounds of milk each day during the first week and 10% the second and third week. This will amount to about seven to eight pounds of milk daily during the first few days, depending upon the breed and size of the calf. Feed half this amount twice a day.

Daily feeding schedules for large and small calves are shown in Table 1. This schedule and system of rearing calves is known as the "Limited Whole-Milk and Dry Calf-Starter Method". Some farmers feed more milk; however, this is unnecessary. Calves will grow faster if fed larger amounts; however, at one year of age and younger this extra growth will not be noticeable.

Birth to Weaning

This is the most critical time in a calf's life, and it is susceptible to digestive upsets, respiratory infections, and scours. The feeding equipment must be cleaned and sanitized the same as milking equipment to prevent the growth of disease-causing organisms. During this time the digestive tract changes quite rapidly from a highly digestible liquid diet to a ration of dry feed at weaning. It is therefore very important to make gradual changes in the amount, composition, or brand of milk replacer or milk.

Milk-Replacer Feeding Schedule

Although each milk-replacer feeding program may be slightly different, all usually follow the schedule shown in Table 2. As a rule they

need only to be mixed with water and fed in place of milk as soon as the calf is off colostrum feeding. The change from colostrum to milk replacer may be a rather drastic change for a three-day-old calf; therefore, a mixing of the two for several days is recommended. Twenty-five pounds of milk replacer is recommended to rear a calf. About 300 to 350 pounds of whole milk is often fed. A milk-replacer feeding plan is usually more economical; however, milk-fed calves usually grow and look better. This difference soon disappears after weaning.

Milk replacers vary considerably in their quality. The best milk replacers contain at least 20% protein and 10% fat. Many dairymen prefer about 20% fat and claim there is less trouble with scours. The difference in cost between a high- and low-quality milk replacer may be substantial. Do not hesitate to pay the additional cost for the higher-quality replacer.

Feeding Pickled Colostrum

The colostrum produced during the first three to four days after calving is a valuable feed for calves. It can be preserved by pickling in large, plastic garbage cans. It is important to use plastic because metal will corrode. Use three cans, one for filling, one for pickling, and one from which to feed. Pickled colostrum should be kept in the calf or cow barn but not in the milk

Table 1. Suggested Daily Whole-Milk Feeding Schedules for Dairy Calves (Feed amounts shown - in pounds - twice daily)

Age	Calves weighing over 80 pounds at birth	Calves weighing under 80 pounds at birth
1 to 3 days	with the cow	with the cow
4 to 7 days	4.0	2.5
Second week	4.5	3.0
Third week	5.0	3.5
Fourth week	4.5	3.5
Fifth week	3.5	3.0
Sixth week	3.0	3.0
Seventh week		2.5
Eighth week		2.0
Ninth week		1.5
Total fed	319	328
Expected daily gain to seven weeks	1.2	0.8

Table 2. Suggested Daily Milk-Replacer Feeding Schedules for Dairy Calves (Feed amounts shown twice daily)

Age	Calves weighing over 80 pounds at birth		Calves weighing under 80 pounds at birth	
	Replacer (pounds)	Water (pounds)	Replacer (pounds)	Water (pounds)
1 to 3 days	with the cow		with the cow	
4 to 7 days	0.5	4.5	0.4	3.5
Second week	0.5	4.5	0.4	3.5
Third week	0.5	4.5	0.4	3.5
Fourth week	0.5	4.5	0.4	3.5
Fifth week	0.5	4.5	0.4	3.5
Sixth week			0.4	3.5
Total fed	32.0		31.2	
Expected daily gain to seven weeks	1.1		0.6	

house. Temperatures of 60° or cooler are excellent for fermentation. High temperatures in summer may cause putrefaction and spoilage.

Pickling of colostrum requires about 7 days. Although the pickling has just started, you may feed it as soon as needed. If it has been stored for more than one month, it will likely become too acid.

When feeding pickled colostrum always stir it well, breaking up the fat before adding to warm water. Warm water is helpful to dissolve the butterfat. Mix colostrum with warm water at the rate of two parts pickled colostrum to one part warm water. Pickled colostrum can be fed to the calf at the third or fourth day of life.

Shifting from pickled colostrum to milk and back again will cause no digestive disturbances. If a calf balks or shows a dislike for the change, merely dilute the pickled colostrum with fresh milk or milk replacer. Feed the pickled colostrum at the same schedule as shown under the whole milk feeding schedule, Table 1.

Feed Dry Calf-Starter

It is important that your calf learn to eat dry calf-starter at an early age. Rub a little into the calf's mouth on the fourth day. Place a feed box in a well-lighted part of the calf pen and put a small amount of fresh starter in the box each day until the calf is eating readily. Then feed only what the calf will clean up. Feed all it will eat until a daily maximum of four pounds is reached for larger breeds and three and a half pounds for smaller breeds. Continue to feed dry calf-starter until your calf is three months of age. At this time, switch over to a growing ration or herd mix.



Figure 3. There are several ways of feeding milk or milk replacer to calves. You may prefer a nipple bottle as shown or a nipple pail or an open pail.

Feeding Hay

Feeding hay to calves before weaning is not necessary. Hay takes time to feed, and any loose hay must be cleaned up around the stall or pen. Calves fed hay may weigh a few pounds more at weaning; however, this difference is only in body fill and not growth. Hay should be fed after weaning.

If, however, you prefer to feed hay, start when calves are two weeks of age. Feed your best hay to the calves, making sure that is clean, fine, and free of weeds. Contrary to opinion in some areas, legume hay is satisfactory. A mixture of legume and grasses is, however, preferable.

Feed all the hay the calf will clean up. Put the hay in a rack instead of on the floor where it is likely to get messy. If your calf seems to prefer



Figure 4. Wean your calves when they have been eating one and one half pounds of calf starter for three consecutive days or at six weeks of age, whichever comes first.



Figure 5. Tape measure one of your calves each month and plot its growth on the 4-H record. You can then determine if it is making normal growth for its breed. Pull the tape measure snug but not tight.

eating hay instead of grain, feed the grain first and feed less hay.

High-quality hay is an excellent source of many vitamins and minerals. For example, it is rich in carotene from which vitamin A is formed. It is also rich in vitamin D and calcium.

A Three-Month-Old Calf

Now let us suppose that you have just bought a three-month-old calf. Find out the kind of feed that she has been getting and change gradually to a growing ration or herd mix. Feed grain at the rate of three or four pounds per day. Feed, from a rack, all the hay she will consume. Do not allow the heifer to get overly fat but keep her in a good thrifty growing condition.

Amount Of Feed Required

Under the limited whole-milk and dry calf-starter method described above, the following amounts of feeds are required to rear a calf to six months of age.

Whole milk	350 lbs.
Calf starter	200-300 lbs.
Growing mixture or herd ration	200-300 lbs.
Hay	500-700 lbs.

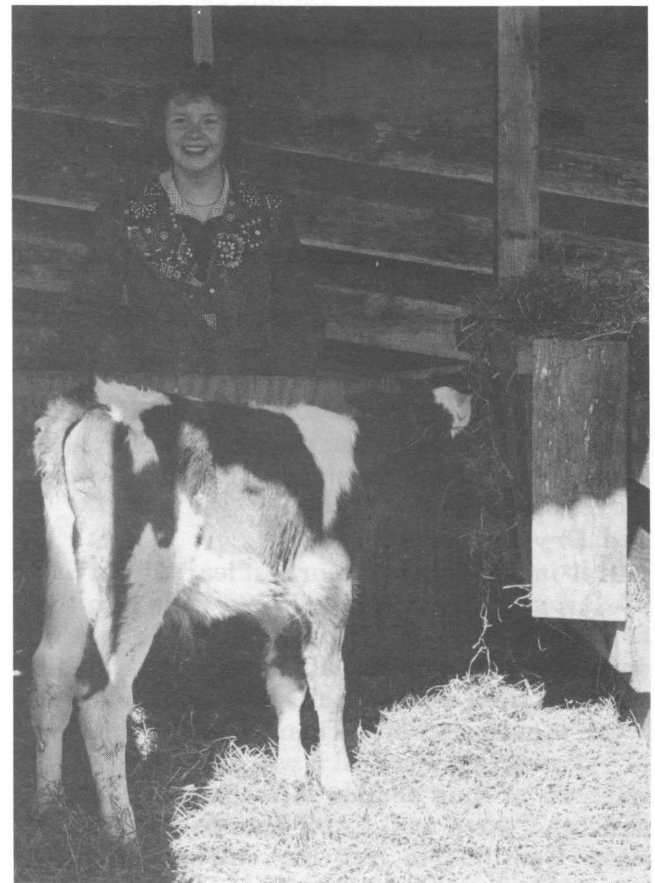


Figure 6. Always feed your best hay to the calves.

LESSON 3: KEEPING YOUR CALF HEALTHY

The milk production of a herd depends basically upon 1) the genetic potential of the cows, and 2) the environment (care and feeding) provided. The genetic potential of the herd may be improved by buying herd replacements or breeding the cows to bulls with known transmitting abilities and rearing the calves. The second method is usually the most economical and successful. About 25 percent of the cows are culled from most herds each year because of low production, failure to conceive, and problems of the udder or feet and legs. This places a great deal of importance upon securing replacement animals.

An outstanding dairyman once said, "The future of the herd lies in the hands of the person rearing the calves." No animal will ever produce to her maximum genetic potential if she has not been grown properly. The main objective is to rear the calf from birth to maturity in an economical manner, allowing her to develop her full genetic potential. To meet this goal, it is important that each calf receive a good start so that she may freshen at 24 months of age.

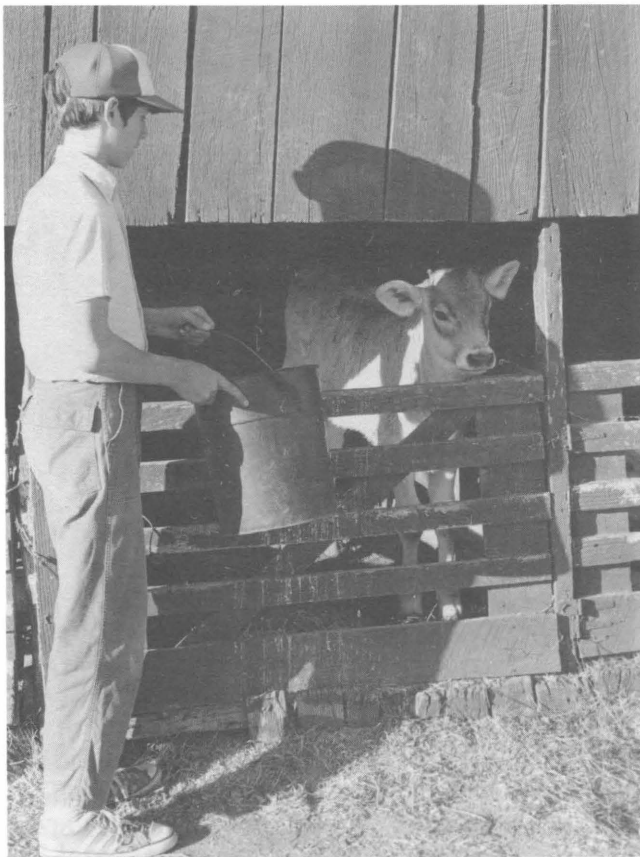


Figure 7. Daily care and attention is very important in any calf rearing program.

A calf mortality study, conducted by the author several years ago at Cornell University, revealed some interesting findings. It showed that herd size played a significant role in calf mortality. In Table 3 you will note that 76 herds contained from 40-50 cows; 7.4% of the calves died before three months of age, and 6.8% were born dead or abnormal, for a total of 14.2% mortality. The second line indicates a herd size of 51-75 cows; skipping over to the total mortality figure, you will note it to be 16.1%. At this time you may wish to note that column with the heading "Born Dead or Abnormal" averages about 7.5%. This may at first seem unusually high; however, after time to ponder you will probably agree that a rather large number of calves are born dead, or are abnormal in some way and, therefore, must be sacrificed. This study compared closely with those made in other states. If you look at the third line, the herd size ranging from 76-100 cows, you will note the total mortality to be 17.1%. The next line, with herd size from 101-125 cows, the total mortality is 17.7%, about the same. The next line, with herd size from 126-200, the mortality moves up to 21%. The last grouping is from 201-350 cows with a total mortality of 33.4%.

You are apt to believe that small herds might have rather poor, antiquated calf rearing facilities, and that large herds probably have more sophisticated and up-to-date rearing methods. However, as herds increase in size, the increased problems of management apparently divert attention from calf rearing.

Table 4 indicates that the person feeding the calves plays a very important role. When the dairyman's wife feeds the calves, the total mortality is 13.7%. When the children on the farm, probably all well-trained 4-H members, feed the calves, mortality increases to 16.1%. When the hired man feeds the calves mortality reaches 18%. This is not to suggest that hired men do not know how to feed calves, but rather that they may have too many responsibilities. It also suggests that farmers may wish to consider a bonus payment plan for every calf reared to three months of age. This would very likely decrease calf mortality.

The table also points out that the wife or mother is more apt to notice the first signs of illness, such as coughing, diarrhea, listless eyes, a hot dry nose, and drooping ears. They are also more likely to treat the calf immediately rather than wait until the next day to see if the calf is better. Early diagnosis and immediate treatment of illness is most important in calf rearing.

The use of a rectal thermometer is a most

Table 3. Calf Mortality and Herd Size

No. of Herds	Herd Size	Died Before 3 months %	Born Dead or Abnormal %	Total Mortality %
76	40-50	7.4	6.8	14.2
94	41-75	8.7	7.4	16.1
37	76-100	9.6	8.5	18.1
23	101-125	9.7	8.0	17.7
14	126-200	14.2	6.8	21.0
3	201-350	21.3	12.1	33.4

Table 4. Who Feeds the Calves

Person Who Feeds Calves	Calves Died Before 3 Months %	Calves Born Dead or Abnormal %	Total Calf Mortality %
Wife	6.3	7.4	13.7
Children	8.4	7.4	15.8
Owner/Manager	8.8	7.3	16.1
Hired Man	11.7	6.3	18.0

important aspect of calf rearing. If suspicious about a calf's health, take its temperature. A temperature of over 103° indicates trouble. Many veal calf operators use an electronic thermometer so that temperatures can be taken quickly and recorded daily. The temperature will go up before the signs of illness previously mentioned are observable. Treatment with antibiotics at this time often pays dividends in reducing mortality.

Calfhood Diseases

Despite every precaution, disease will occasionally appear in calves. During some years, calf diseases are more rampant than during others. The majority of calfhood diseases are manifested by diarrhea and pneumonia or both. These conditions may be caused by a variety of organisms and factors.

Calf Scours or Septicemia Complex (may also be referred to as white scours, diarrhea, enteritis, and colibacillosis).

Calf scours is by far the most important disease syndrome of baby calves. Depending upon degree of exposure, virulence of the strain or organism involved, and individual resistance, the onset may be sudden with death occurring in 24 hours. Or, more commonly, the onset will be more gradual with the appearance of symptoms such as profuse diarrhea, gaunt appearance, rough



Figure 8. A rectal thermometer can be useful to determine sickness in calves before many of the external signs show. The normal temperature of a calf is 101.5° F.

haircoat, and dehydration preceding death or recovery. In either case, the disease usually appears within 72 hours after birth. A very common organism, *Escherichia coli*, is the usual cause of this disease. There are well over 200 recognized strains of this organism, some of which are harmless and others which are highly pathogenic. They are almost universally present in manure and are antigenically distinct, and therefore, little hope can be offered for developing a vaccine that will prevent the disease.

The root of infection by *E. coli* usually is oral. The toxins produced in the intestines interfere with normal digestion and cause the symptoms previously mentioned.

When *E. coli* invade the calf through the navel, the disease becomes septicemic, and it is thus distributed throughout the body. The scours-septicemia complex is more difficult to treat than when *E. coli* is confined to the intestines. Thus, prevention by the use of iodine and dipping the calf's navel cord becomes much more important than treatment.

Once the disease appears in a calf, it will probably appear in successive calves as they are born if they have environmental contact, unless something is done to break the cycle. The most effective way to do this is to have cows calve somewhere else. The best place is outdoors on a clean pasture close to the barn so that they may be observed regularly. Sanitation by the sun, wind, and rain provides a much cleaner area than the best sanitation provided through cleaning of a maternity stall.

Calf scours may also be caused by overfeeding. Overfeeding, with engorgement of the stomach, leads to digestive upsets with subsequent diarrhea and a sequence similar to that seen with infection. Severe diarrhea causes dehydration and death. Withholding feed helps to resolve this problem. Instead of milk or milk replacers, the calf should be fed an electrolyte solution made up of a heaping teaspoon of table salt, a heaping teaspoon of baking soda, and a tablespoon full of corn syrup in one gallon of water. Feed up to one quart of the mixture three times during a 24-hour period. During the second 24-hour period, return to feeding milk or milk replacer by feeding one-half electrolyte solution and one-half milk or milk replacer. Return completely to the milk or milk replacer during the third day.

The stress of calf scours is a serious condition in young calves. This stress cannot be tolerated for long, even with the best of treatment. Prevention is therefore most important, and, if

calf scours is much of a problem on your farm, you should seek the professional help of your veterinarian rather than continue with trial-and-error home remedies.

Pneumonia

Pneumonia is the second-most common disease causing death loss in young calves. Pneumonia is an inflammation of the lungs that may be caused by a variety of organisms. It is often associated with the scours-septicemia complex. Primary symptoms of pneumonia are coughing, rapid respiration, depressed appetite, reluctance to move, and fever. Predisposing factors of this disease are overcrowding, exposure to drafts, inadequate ventilation, and unsanitary conditions.

Low temperatures alone will not cause pneumonia. In fact, calves kept in well-bedded, dry pens in a cold, draft-free but well-ventilated barn are generally healthier than those kept in a tight, warm barn where the ventilation is poor. Under the latter conditions, humidity is usually high with decomposing manure producing ammonia which causes further irritation of the lungs.

The organisms that cause shipping fever in adult cows may also cause pneumonia in calves. The bacterium *Pasteurella multocida* and a virus, *parainfluenza-3*, are harbored to some degree by most adult cattle. The cow provides immunity for her calf through her colostrum milk. If, however, the calf fails to receive colostrum, it will not have any immunity, and since the organisms are present to some extent in virtually the entire cattle population, the risk of infection for the calf is indeed great. The pneumonia complex may appear in calves at any time, but is more prevalent after the first two weeks of age.

Clean Utensils and Facilities

The utensils used for feeding whole milk or milk replacer must be thoroughly cleaned after each use. First rinse with water, then scrub with a good cleansing solution and rinse with a sanitizing agent. Dried milk or milk replacer is a good medium for bacteria such as *Salmonella* to grow and multiply. Such contamination can cause severe digestive upset.

Uneaten calf starter should be removed from the feed box after several days. Wet and moldy feeds are not only unpalatable, but when consumed, even in small amounts, can cause the animal to go "off-feed." Care should also be taken that feeds have not been contaminated with insecticides when spraying for flies or lice or mites.

Provide Water

Clean, fresh water should be provided after the calf has reached three weeks of age. Pails and drinking cups should be kept clean and free of feeds, bedding, and manure. Older heifers on pasture should be protected against contaminated water. Small ponds are sometimes used by animals for cooling off in hot weather and become contaminated by urine and feces.

Pasture for Calves

Although pasture is a good feed for calves and is digested readily, it is not recommended for young calves because of the relatively low dry-matter content. Calves should be six months old if they are to receive a major part of their feed from pasture. In addition, they should receive 2 or 3 pounds of grain and have access to some hay. Shade and water are important to calves on pasture. Shade is especially necessary during the hot part of the day. There must also be some protection from flies.

Feeding Silage to Calves

Although silage is not harmful to young calves, many dairymen do not feed it until the calves are about six months of age. Baby calves have a higher energy requirement per body weight than six-month-old calves, and should use their stomach capacity for feeds that have a higher energy value. Good quality hay has an energy value of about 50% compared to about 18% for corn or grass silage.

Feed Regularly

Regularity in feeding calves is also important. Weigh the milk or milk replacer at each feeding and make changes gradually. The milk or milk replacer should be fed at a temperature of 95-100°F. The temperature of milk or milk replacer is not as important, however, as the regularity of the temperature. Some dairymen get along fine by feeding milk or milk replacer that is much cooler.

LESSON 4: CALF HOUSING SYSTEMS

There are more housing systems today for baby calves than ever before. The popularity of these systems varies considerably between sections of the country because of climate. All are used in Virginia. All good systems, however, include the same principles.

1. Low stress; comfort for the calf.
2. A dry floor on which the calf may stand or lie; usually bedded for added warmth and comfort, and for absorption of urine and manure.
3. Well-ventilated with no drafts.
4. Low humidity; no condensation of moisture on walls or ceilings.

One merely has to use one's nose to check a calf facility for ventilation. If the calf barn smells like a calf barn, more ventilation is needed! A well-ventilated calf barn will not have an offensive odor. Poor ventilation usually indicates trouble.

The Calf Hutch

The calf hutch is one of the newest innovations in calf rearing. Calf mortality is usually lowest with this system. Disease-causing organisms do not multiply as fast in a hutch as inside a calf barn where it may be warmer and have a higher humidity. A calf in a hutch is in an environment that may be virtually free of disease organisms. The calf is also isolated from other calves, and organisms cannot easily enter its

environment. The hutch should be moved four feet to a new location after the calf has been removed so that the new calf enters a clean environment. When using the calf Hutch, it is important to use plenty of bedding so that the bed remains dry.

Temperatures of 20°F below zero in northern New York have caused no bad effects on calves in hutches. Calves reared in hutches grow long coats in winter and have keen appetites. Calf hutches are more popular in the north, northeast, and northwest states.

The calf hutch should be constructed of standard four-by-eight-foot exterior plywood, 5/8" in thickness. Following construction, the hutch will measure eight feet long, four feet high, and four feet wide. A pen, constructed of woven wire and measuring at least four feet square, should be constructed in front. The hutch should be placed on six inches of coarse stone to provide drainage. You should include a box for feeding calf starter and a hay rack if you wish to feed hay.

The hutch should be constructed with white glue and coated nails so that there are no seams to allow a draft. It will thus be airtight and not allow wind to blow inside. You may demonstrate a proof of this by trying to blow into a bottle. Since it is already full of air, it is nearly impossible to blow more air into it. By use of an instrument to measure air flow, the author found that three feet beyond the entrance of the hutch

there was virtually no air movement. One may further test this point by crawling into a calf hutch and checking it for comfort. Hutch openings should face the south to allow the sun to shine inside.

The calf hutch system does require more labor than other methods, and the weather may not always be comfortable for outside work.

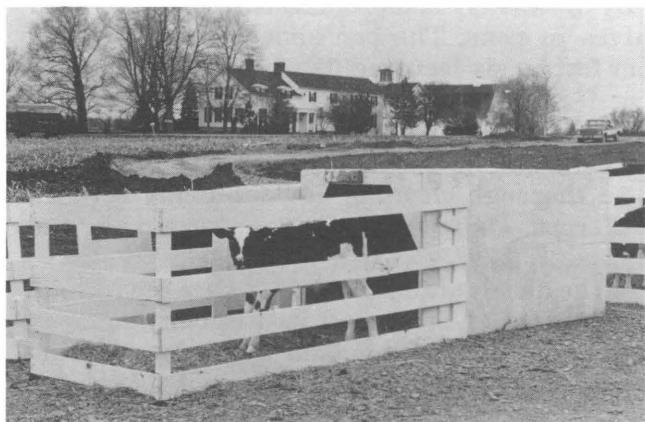


Figure 9. The calf hutch requires more labor but also has certain advantages.

Elevated Stalls

Elevated stalls are popular in many parts of the United States because they, too, provide the

principles important to calf rearing. The elevated stall is preferred over housing in pens because less labor is required for management. They are portable and, since they can be cleaned more completely, the build-up of disease-causing organisms may be controlled.

Elevated stalls factory-made of steel may be purchased or they may be made on the farm of 1/2" exterior plywood.

Plans for the model shown are available from Penn State. The front half of the floor should be solid and sloped toward the rear for drainage. The rear part of the floor may be covered with hardwood slats placed one inch apart. A small pail for feeding milk or milk replacer and providing water after three weeks of age may be placed in the stall. It may also include a small pail for feeding calf starter. Dairy men who prefer to feed hay may include a hay rack.

Elevated stalls should be cleaned and disinfected between calf crops by washing thoroughly with a household bleach diluted 30 parts of water to one of bleach. Some dairymen prefer to have two sets of elevated stalls, allowing one set to be cleaned and sitting outside in the elements to further become disinfected while the other set is in use. If you use two sets, exchange them every two or three months.

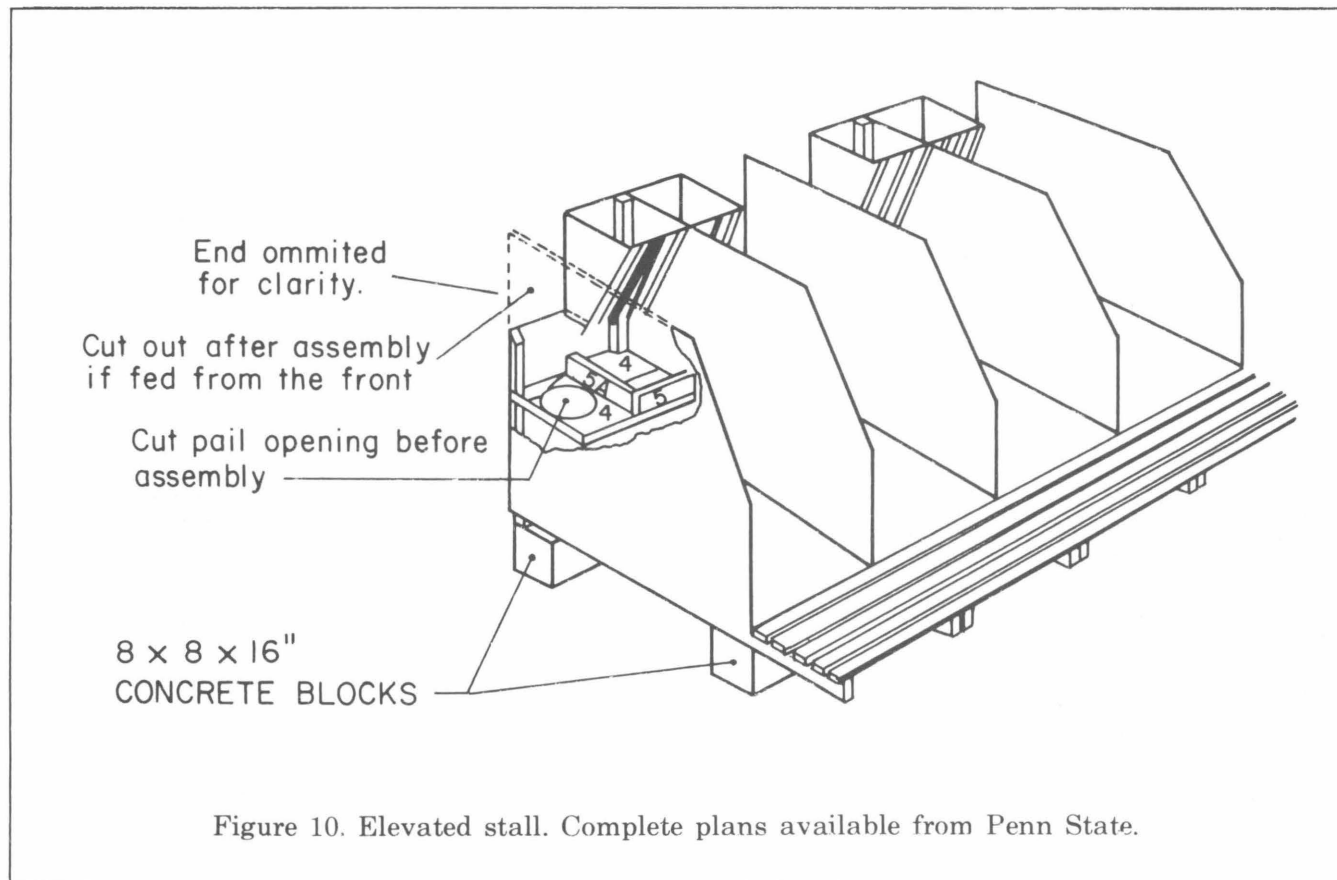


Figure 10. Elevated stall. Complete plans available from Penn State.

Because the animals may be examined more closely, elevated stalls also allow one to more easily diagnose early illness, thus affording prompt treatment.

Elevated stalls should be used in buildings that offer adequate ventilation but no drafts. If the building is drafty, the calf is more susceptible to a draft when placed in an elevated stall. You may easily determine the discomfort of a draft by sitting near a partially open door on a cool day. Plenty of ventilation is important but drafts cannot be tolerated.

Cold Calf-Housing System

A cold calf-housing system that offers individual confinement has recently been developed at Virginia Polytechnic Institute and State University by W. H. Collins and W. R. Murley. In principle, it is like a number of calf hutches placed side by side. It is called a "cold" system because the building lacks insulation and a heating system. Figure 12 shows the calf pen to measure four feet wide and six feet long with a hay rack and grain box. A service alley extends the full length of the building in front of the pens so that labor may be kept to a minimum. Milk or milk replacer may be fed to calves from the service alley. The roof extends three feet beyond the pen with the exercise area extending eight feet beyond the pen. The exercise lot has been paved with concrete sloping from the building. The calf pen and service area are not paved. The building faces the southeast, thus allowing the sun, which prevails in the southeastern part of the United States even during winter, to aid in

keeping the facility dry and warm. These structures have met with wide acceptance in Virginia because they offer the four principles listed at the outset as well as reduced labor in calf feeding. Details for building may be secured by writing W. E. Collins, Agricultural Engineering, VPI&SU, Blacksburg, Virginia, 24061.

Pens on the Floor

By necessity, some dairymen still rear their calves in pens. The pen should measure about four feet by six feet, and its walls should be about four feet high and constructed of solid material such as plywood to prevent drafts from striking the calf. The floor should be of concrete to allow for a thorough cleaning and sanitizing between calf crops. Use plenty of straw to keep the bed dry.

The disadvantages of this system are its high requirement of labor and its difficulty to clean and sanitize. The amount of disease-causing organisms may build to such a high level after repeated yearly use that calf mortality may become very high.

Unused Buildings

Some 4-H members may live on farms that have unused buildings such as chicken houses or garages that are perfectly well-suited to rearing and housing several calves. All you need to do is clean the building, construct pens, and add plenty of straw for bedding. An unused building will be free of any disease-causing organisms and is well-suited for a 4-H dairy project. You should check for adequate ventilation but make sure there are no drafts.



Figure 11. Cold calf-housing systems of this type offer many advantages. Mortality rates are usually very low. They are reasonable in cost and offer efficiency of labor and management.

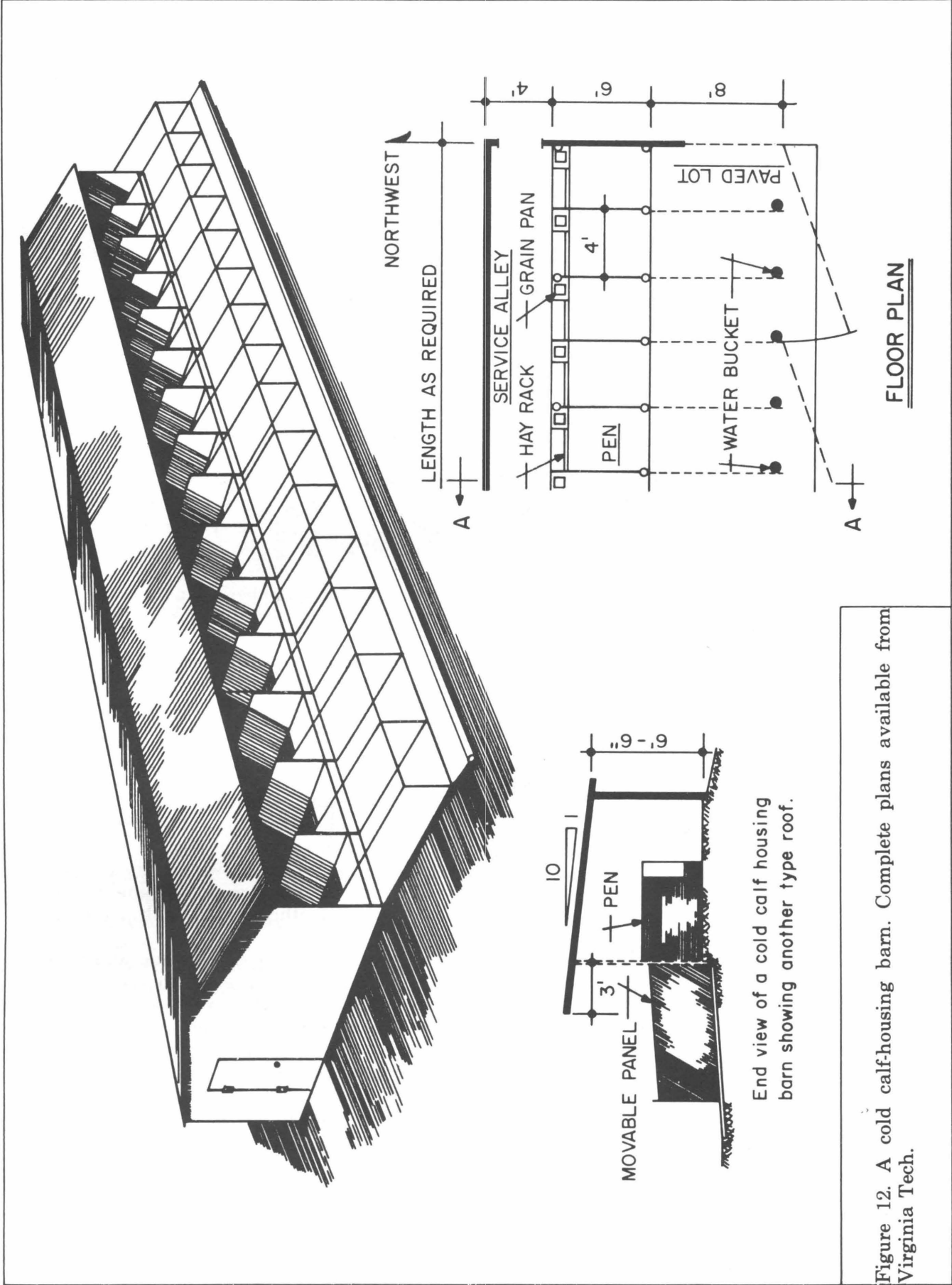


Figure 12. A cold calf-housing barn. Complete plans available from Virginia Tech.

LESSON 5: IMPORTANT THINGS FOR YOU TO DO

There are certain things that should be done when your calf is quite young in order to prevent difficulties when she becomes a cow.

Dehorning

It is important that dairy cattle be dehorned since hornless cattle cause fewer udder and body injuries and are much easier to stanchion and handle. They are also in much greater demand because they will enter another herd without causing as much fighting and general disturbance. Only a few years ago it was thought that horns improved the appearance of cattle in the show ring. It is not the practice today, and there is no discrimination against dehorned cattle in any of the major shows.



Figure 13. The electric hot iron is an excellent method of dehorning. It should be done as soon as the horn button can be distinctly felt, usually at about 3 weeks of age. The iron should be red hot and held firmly over the horn button. A copper colored ring should show when the hot iron is raised. Rock the iron back and forth in all directions when burning. If the copper colored ring is not distinct, place the iron down again.

The best time for dehorning calves is when they are about three weeks of age or when the horn button can be distinctly felt. Burning the horns with an electric dehorner is the best method of dehorning. It is bloodless, can be done at any time of the year, is complete, and can be done quickly.

Electric dehorners can be bought from livestock equipment companies, and come in different sizes or with exchangeable tips for different sizes. Heat the iron as directed by the manufacturer, making sure it is not touching any bedding or hay. Clip the hair around the base of the horn with scissors to reduce the smoke and to insure a good burn. Heat the dehorner to red hot, then firmly place it over the horn and hold it on the skin around the base of the horn until the skin develops a bronze or copper color. This will kill the growth tissue of the horn and the button will drop off in several weeks.

Although this method may seem rather cruel, the pain apparently lasts for only a short time because the calves usually return to eating within thirty minutes. Other methods of dehorning may produce a more lingering pain and cause the calves to go off their feed and lose considerable weight.

Dehorners that mechanically cut large horns on older animals also do an effective job when they are used by a skilled operator, but their use carries a risk of hemorrhage and infection.

Extra Teats

Extra teats on cows are a nuisance because they may start secreting milk, interfere with milking, and distract from the appearance of the udder. The best time to remove extra teats is when the calf is one to two months of age. If the extra teats cannot be readily distinguished or are attached to another teat, consult a veterinarian about removal.

There is little or no bleeding and no severe shock when the extra teats are removed at this time. First, thoroughly wash and disinfect the udder. An alcohol solution is suitable. Then stretch the teat slightly and cut it off with a clean sharp pair of scissors. Disinfect the cut with iodine or other antiseptics. Apply fly repellent during fly season.

Identification

All purebred breed associations require accurate identification for registration. It is also necessary for the commercial dairyman. He must be able to identify all calves in order to save the calves from the best cows in the herd. Color

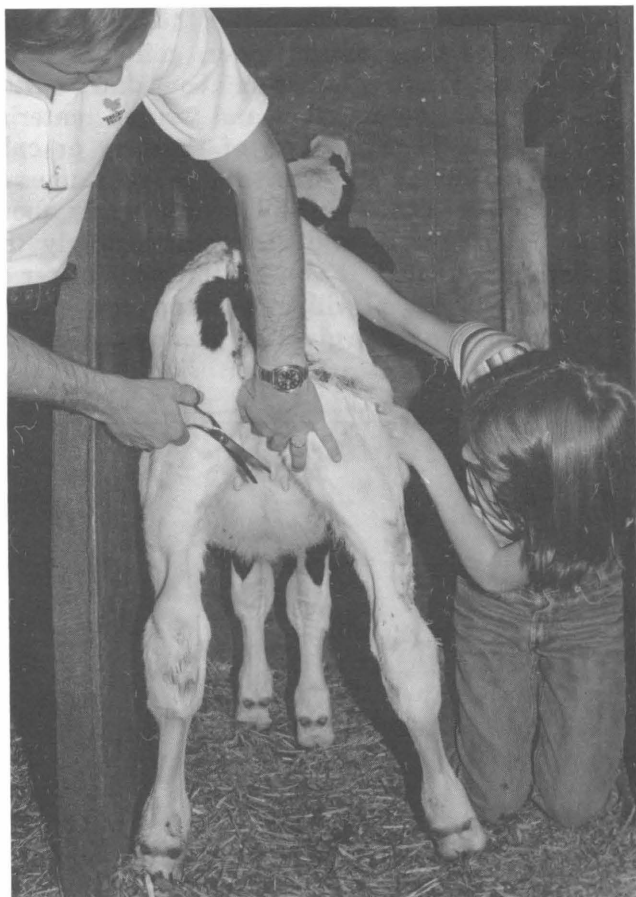


Figure 14. Extra teats should be removed at a young age. Use sharp scissors, but be careful to not cut another teat. Iodine dabbed on afterward should complete the operation. You may wish to place the calf on its back to restrain it completely to prevent your cutting the wrong teat.

markings or photographs are probably the best way to identify the animals of the broken-color breeds. Tattoo numbers in the ear, ear tags, or brands are best for solid-colored breeds, but may be used on any breed.

Every dairyman should have a record system that meets the needs of his herd. These records should include the identification number, a sketch or photograph, date of birth, and the sire and dam.

Vaccination for Diseases

You should talk to your local veterinarian about the vaccinations recommended in your area.

Many veterinarians recommend vaccinations for brucellosis between three and twelve months of age, especially if the dairyman is involved in the buying and selling of cattle for breeding purposes. If the herd is closed to outside animals, there is not as much risk; however,

many veterinarians recommend a vaccination program because of its protection at a minimum cost.

Your veterinarian may recommend vaccination for leptospirosis at six months of age, repeated twice a year for mature animals.

Many veterinarians will recommend a nasal infusion against infectious bovine rhinitis (IBR) once a year and in injectable vaccine once a year. Many dairymen have this done in fall and in early spring. The treatment is only for animals that have not been bred.

Your veterinarian may also recommend vaccination against blackleg. This vaccination may be given at the same time as the brucellosis vaccination.

Pasteurella multocida is a bacterium which causes pneumonia. Other predisposing factors are drafts and poorly ventilated buildings. The disease is highly contagious and is most prevalent where many calves are confined. A vaccination at three, five, and seven weeks of age may be recommended. Discuss this also with your veterinarian.

Treatment for Internal Parasites

Worming of heifers in the spring and fall is the practice on many farms. Your veterinarian may likely agree with this practice.

Teach Your Calf to Lead

You will want to show your animal to your friends and perhaps exhibit her at the county fair. When she is a cow, you may at times find it necessary to lead her from one barn or area to another. Animals that have been trained to lead

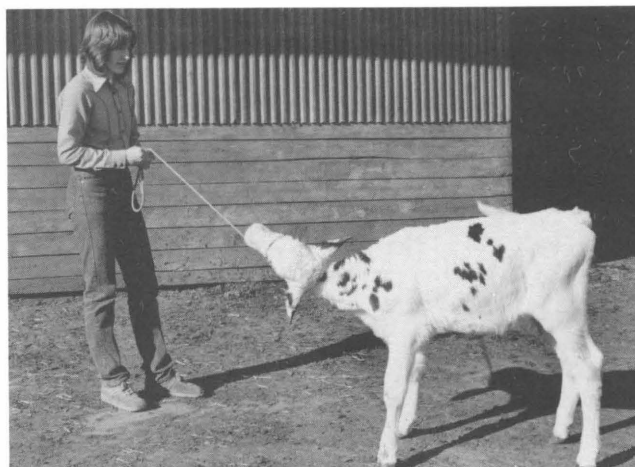


Figure 15. It is easier to teach your calves to lead when they are young. Tie them to smooth wall for several hours each day so they cannot get their legs caught. They will soon get accustomed to the halter and will soon learn to lead.

and pose properly at an early age usually present the best appearance in the show ring.

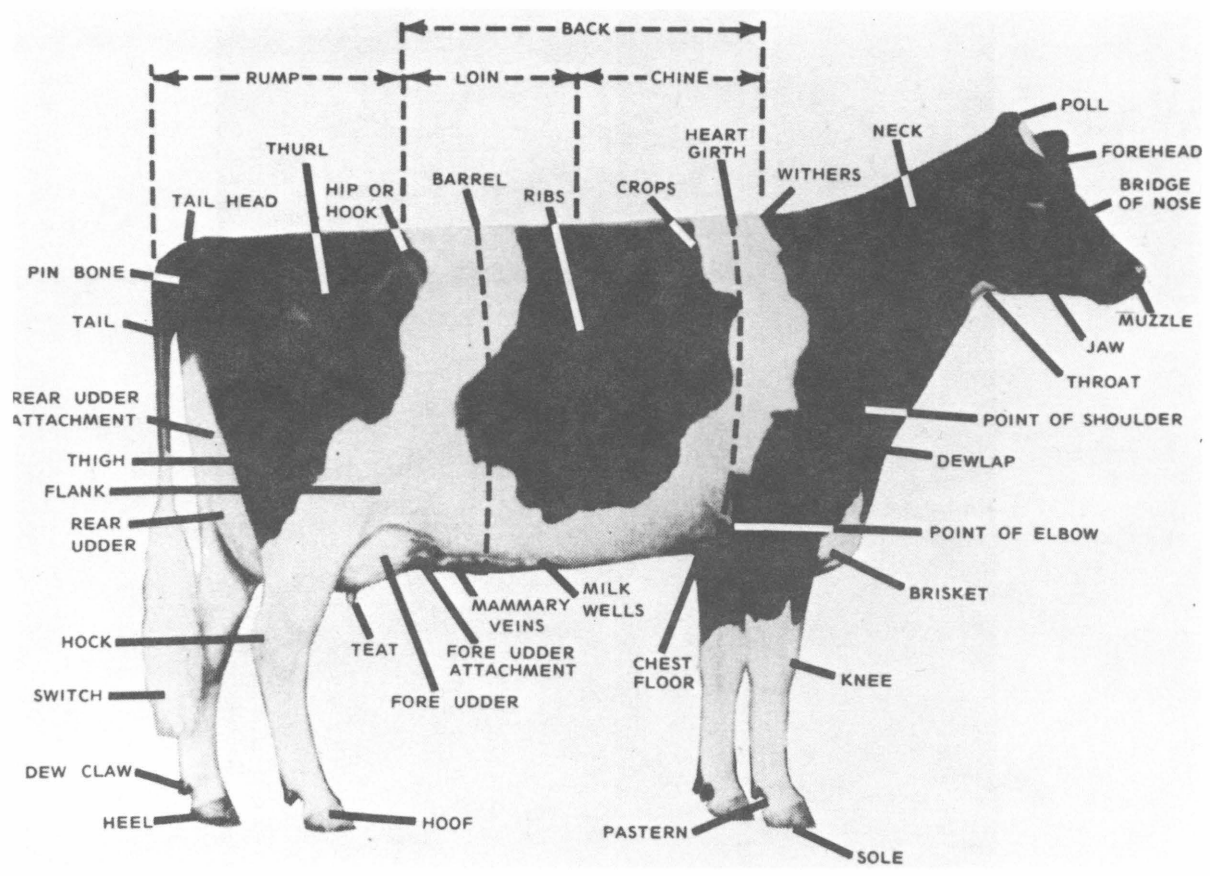
You can easily teach your calf to lead when she is three to four months of age. Tie her with a rope halter to a wall or solid partition several times until she learns that it is useless to try to escape. Then keep working until she leads readily.

Learning the Parts of a Dairy Cow

Now that you have a calf, you will find

yourself talking with other 4-H members, listening to your dairy leader, going to dairy shows, and reading bulletins about dairy cattle. Much of the conversation and written material will refer to certain parts of the cow or calf. Therefore, you should learn the proper names of all the parts so that you will be able to talk about your calf properly and understand clearly the bulletins you read. If you exhibit your heifer at the county fair, you will understand more clearly the reasons the judge gives for placing the animal in its class.

NOTES



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