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FEEDING AND MANAGEMENT OF DAIRY CALVES AND YOUNG DAIRY STOCK

W. K. BRAINERD and H. P. DAVIS

Dairy Division



Teaching the Calf to Drink Milk

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A. D. MELVIN, Chief

FEEDING the cow well before calving insures a strong, healthy calf. The best time to wean the calf is after it takes the first milk. Early weaning makes it easier to teach the calf to drink.

Everything about the calf should be scrupulously clean.

Milk from infected cows or from a creamery should be pasteurized before it is fed.

Calves should be fed sweet milk of a uniform temperature and should always receive a little less than they desire.

All calves should be fed regularly; very young calves should be fed three times a day.

At first the calf is fed whole milk, the quantity being gradually increased. Skim milk is substituted as soon as practicable and if cheap is continued until the calf is six months old. Ordinarily the maximum quantity of skim milk that can be fed economically is 20 pounds a day. When the calf is 2 weeks old, grain and bright, clean hay should be offered; the quantity fed should be increased as the calf's appetite demands.

Milk substitutes are not equal to milk, but give fair results when used with care.

Quarters must be clean and dry, with plenty of bedding.

Stanchions save milk and prevent the calves from sucking one another.

Horns are more easily prevented than removed.

Water is necessary for calves.

Marks for identification should be plain without disfiguring the animal.

Calf diseases are largely the result of filth and carelessness. Prevention is cheapest and best.

Young dairy stock should have all the hay they will eat, and grain in proportion to weight.

The heifer should be bred to freshen when about 2 years old. Handling before freshening prevents shyness.

Fall calving usually gives best results.

The young bull should have an abundance of feed, plenty of exercise, and not be allowed too heavy service.

The foregoing points on feeding and management of the dairy calf are discussed somewhat fully in this bulletin.

FEEDING AND MANAGEMENT OF DAIRY CALVES AND YOUNG DAIRY STOCK.

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FEEDING AND MANAGEMENT OF THE DAIRY CALF.

FEEDING BEFORE BIRTH.

POOPLY nourished cows give birth to weak, puny calves which are hard to raise. The feeding of the calf, therefore, begins before it is born. The food elements necessary for the development of the calf are taken into the stomach of the cow, digested, assimilated, and transmitted to the calf through the umbilical cord, the connection between the mother and the calf. It is evident that if the cow does not receive food enough to keep herself in thrifty condition and at the same time develop her calf, both she and the calf must suffer. In endeavoring to raise good, thrifty calves many dairymen handicap themselves at the start by not properly feeding the pregnant cows. Such cows should have an abundance of palatable and succulent or juicy feed in order to insure good body flesh and healthy, thrifty condition at calving time. The calves will then be well developed, strong, and sturdy, and ready to respond normally to proper feed and care.

SEPARATION FROM THE COW.

It is assumed that the calf is not to be raised by sucking the cow, but is to be fed by hand. The longer it sucks, therefore, the more difficult it will be to teach it to drink. On the other hand, the first (or colostrum) milk of the cow possesses properties which stimulate the calf's stomach and other digestive organs to action. Colostrum

is nature's physic, and for this reason the young calf should always receive its mother's milk at first. The calf is sometimes weak at birth, and for this reason should have nourishment as soon as possible. It is usually easier to induce the calf to suck the cow than to try to make it drink from the pail. Because of these facts most dairymen prefer to let the calf remain with its mother for about 48 hours immediately after birth. An additional advantage of this practice is that the dam will carefully dry the calf by licking within the first few hours of its life. In the case of a weak calf or one that does not gain strength readily it may be best to allow it to remain longer than 48 hours, although under such circumstances it is sometimes difficult to teach the calf to drink, and serious trouble may result from its failure to obtain food.

TEACHING THE CALF TO DRINK.

It is desirable that the calf be in thrifty, vigorous condition when it is taught to drink. It should be kept without food for at least 12 hours, at the end of which time it will be hungry and will usually drink milk from the pail much more readily than when not hungry. Warm, fresh milk from the mother should be put into a clean pail and held near the floor, in front of the calf, which will generally begin to "nose" about the pail. Once it gets a taste of milk, it will usually drink without further trouble. Often, however, it is necessary for the attendant to put one or two fingers into the calf's mouth, drawing the hand down into the milk as the calf begins to suck the fingers. The calf in this way gets a taste of the milk and often begins to drink without further coaxing. If not, the process must be repeated. Sometimes, however, the calf can not be induced to drink in this way, and force has to be resorted to. In such case the feeder, facing the same direction as the calf, should straddle its neck and back the animal into a corner. The pail of milk should be held in one hand and the nose of the calf grasped with the other, two fingers being in its mouth. The nose of the calf is then forced into the milk, when it will usually begin to drink. (See illustration on title page.)

Sometimes a valuable calf, too weak at birth either to suck the cow or to drink from a pail, can be saved by feeding from a bottle, either with or without a nipple.

CLEANLINESS THE FIRST ESSENTIAL.

Cleanliness is absolutely essential to the successful raising of calves. This is equally necessary in feed, pens, bedding, and pails or utensils. All milk fed should be fresh and clean, and the same is true of other feeds. Calf pens should always be kept clean and be filled with plenty of dry bedding. Great care should be taken in washing

the milk pails. These should be thoroughly scalded with boiling water, or sterilized with steam if possible. Discarded feed should be removed from the feed boxes, which should be thoroughly brushed and cleaned each day. Attention to these details is the best preventive of disease. Nearly all disorders or diseases of the calf are caused either directly or indirectly by lack of cleanliness.

Certain infections causing chronic diarrhea or scours, either contagious or otherwise, are discussed under the head of "Diseases," but there are many small disturbances of the calf's stomach and digestive system which hinder growth and development that are caused by bacteria. Filth and dirt are the natural breeding places of bacteria. Elimination of filth usually means freedom from disease.

PASTEURIZATION OF MILK.

Milk from cows infected with a communicable disease, such as tuberculosis, should always be pasteurized (heated to 145° F. and held at that temperature for 30 minutes) before it is fed to calves. When separated milk from a creamery is fed it should always be pasteurized, because it is practically impossible to know that such milk is free from infection.

QUANTITY AND QUALITY OF MILK.

The quantity of liquid feed that a calf needs depends upon the size and age of the calf and to some extent upon the kind and condition of the feed. At birth a 50-pound calf should have about 8 pounds a day, while a 100-pound one should have about 12 pounds. It is better to underfeed at the start than to overfeed. Many beginners make the mistake of letting the calf have all the milk it wants. This would probably be all right if the calf were fed about every two hours, as is the case when it runs with the cow. When a young calf which has been without feed for 12 hours or more is given all the milk it will take there is danger that it will gorge itself, thus causing digestive troubles. It is much safer to keep the quantity of feed well below the capacity of the calf than to risk overfeeding.

Care should be taken to see that any milk fed the young calves is of uniform temperature of about 90° F. Many feeders attempt to overcome poor quality in the feed by increasing the quantity; that is, they feed more skim milk than they would whole milk, the idea being that the added amount of the former makes up for the butterfat which has been removed from the latter. This is radically wrong. The same rules hold good in overfeeding with skim milk as with whole milk. When, on account of age, souring, dirt, etc., the quality of the milk is poor, the quantity fed should be reduced rather than increased, because the danger from infection by such milk is very much greater than from fresh milk, and the pre-

vention of digestive troubles should always be uppermost in the mind of the feeder. The loss of development in the calf on account of a temporary reduction in the ration when for any reason it is sour or nearly so is much less than when the digestive system becomes disordered. A calf can often take a relatively small quantity of bad milk for long periods and still hold its own or even make small gains, whereas a larger portion would endanger its life or give it digestive troubles of a serious nature.

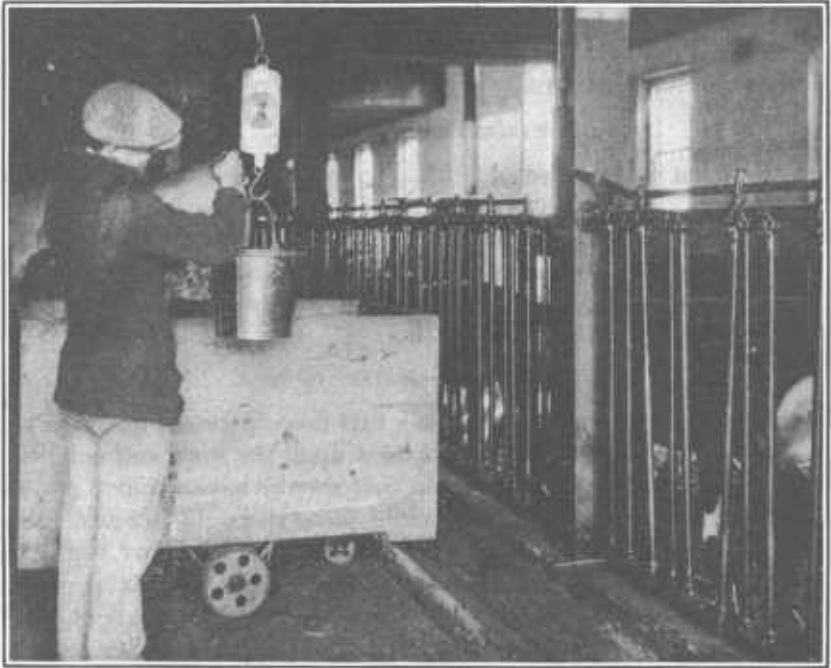


FIG. 1.—Weighing the milk for the calf.

FREQUENCY AND REGULARITY OF FEEDING.

Under natural conditions the young calf receives nourishment every 2 or 3 hours. In hand feeding it is best to follow these conditions as closely as possible, but because of the trouble and expense involved it has been found impracticable to feed calves more frequently than three times a day, and in some cases only twice a day.

It is the practice of many dairymen to feed young calves three times rather than twice a day, because the better results obtained more than pay for the additional work. When this is done the periods between feeding should be as nearly equal as possible. The chief advantages of feeding in this manner are that the calf can not overload its stomach, and that the digestion of the feed is more evenly distributed throughout the 24 hours. When calves are fed

only twice a day the utmost care should be observed to see that the feedings are, as nearly as possible, 12 hours apart. The importance of regularity in feeding can not be overemphasized.

FEEDING DURING THE FIRST FIVE WEEKS.

At least four-fifths of all dairy calves are raised on separated milk, grain being used to supply the fat removed. Usually it pays well to feed whole milk for about two weeks, at the end of which time separated milk may be used in part. The proportion of the latter may be gradually increased until at the end of the fourth week it is used altogether. No fixed rules of feeding, based upon age, can be given, because the size and vigor of the calf must always be considered. Calves especially strong at birth may be put on separated milk entirely at two weeks of age, but this should not be attempted with weak ones. Until the calf is in vigorous and thrifty condition no attempt should be made to change to separated milk. This change should always be made gradually. The schedule given below for feeding calves is suggested as a guide, but it will often have to be modified to suit conditions. The supplementary feeding of roughage and grain to young calves is mentioned later under the respective headings.

FIRST AND SECOND WEEKS.

For the first four days, from 8 to 12 pounds of milk from the dam should be fed. After this time the milk may be from any cow or cows in the herd, but preferably not from any that are nearly dry. Milk containing not more than 4 per cent of butterfat is considered the best for this purpose.

THIRD WEEK.

At the beginning of the third week the substitution of either skim or separated milk may commence at the rate of 1 pound a day. The quantity of the daily ration may be increased 2 to 4 pounds, depending upon the vigor of the calf. The quantity, however, should be kept well below the capacity of the calf; that is, when it does not drink eagerly what is offered, the quantity should be cut down. In most cases, at the end of the third week the ration should be approximately one-half whole and one-half separated milk. Any increase should be made slowly so as to accustom the calf to the additional amount.

FOURTH WEEK.

At the beginning of the fourth week, from one-half to three-quarters of the milk ration should be separated milk. During the week the change should be continued until by the end of the week only separated milk is fed. With especially vigorous calves the change to separated milk may be made about a week earlier.

FIFTH WEEK AND THEREAFTER.

After this time separated milk may be fed entirely unless the calf is very delicate. The quantity fed can be gradually increased until 18 to 20 pounds a day are given. It is usually not economical to feed more than this unless milk is very plentiful.

The time that milk should be discontinued depends upon its cost in relation to the value of the calf, its breed, size, vigor, etc. The season in which it reaches the age of six months and the other feeds available at that time must also be taken into consideration. Six months is probably a good average age at which to wean calves from milk. When the best of hay, silage, and a good variety of grains are available, the calf may be weaned earlier than when such feeds are lacking. The season of good, succulent pasturage presents the best possible condition for weaning a calf, and when this exists the calf can be weaned earlier than when it is lacking. The stronger and more vigorous the calf the earlier it may be weaned with safety. On the other hand, the more valuable the calf the more expense the owner is warranted in incurring to develop it and the later it will probably be weaned. If skim or separated milk is plentiful, calves may be fed profitably until they are 8 or 10 months old.

When the calf is 2 months old, and if it is carefully watched, sour milk, whether whole, skim, or buttermilk, may be fed without harmful results, provided the change from sweet milk is made gradually. It is not well, however, to alternate between sweet and sour.

ROUGHAGE FOR CALVES.

Usually a vigorous calf begins during the second week to pick at the bedding or other material within its reach, and at that time both grain and roughage of the best possible quality should be provided. Clover hay, alfalfa hay, or, if these are not available, the most palatable roughage on hand should be given the calf after the second week. If alfalfa is used, care should be taken that it does not cause scours; this feed should be fed sparingly at first and increased only after the calf gets accustomed to it. The essential points are that the roughage be of good quality and kept clean. The usual mistake in providing roughage is that it is not kept clean. It is either placed on the floor, where it soon becomes contaminated with the droppings, or is put into a manger or feed box, so placed that the calf can easily spoil it. Hay should be furnished at first only a handful at a time and placed so that it can not get soiled. A latticework rack, of metal or wood, is useful if it is placed high enough from the floor so that the calf can not soil the hay in any manner but still have it within easy reach. This rack can be so constructed that it can be hung on the wall or framework of the stall or pen and removed when not needed. For the first six months, at least, the calf should receive

all the roughage of good quality that it will eat up clean. The quantity taken up to the time it is one month old is very small. The rack should be emptied every day and fresh roughage supplied.

Silage may be given after the calf is one month old, but the utmost care should be observed to be sure that it is fresh from the silo. For this reason very young calves, except in the hands of a very careful feeder, should not be fed silage, as it ferments rapidly when exposed to the air. Care should be used in starting with silage, using only a little at first and gradually increasing the quantity as the animal becomes used to it. Generally there is no danger that the calf will get too much roughage that is clean and of the proper quality.

If the calf has access to good pasture during the first 6 months it need not receive other roughage. Pastures used in summer should contain plenty of shade. It is not advisable, however, to have a calf under 2 months of age on pasture in the early spring.

GRAIN FOR CALVES.

Whole milk is "nature's balanced ration" for the calf. When skim or separated milk is fed, other feeds are used to supply the fat which has been removed. Proprietary calf feeds or meals, for feeding with separated milk, have been put on the market. Many of these have merit, but by using the feeds usually found on the farm or in markets near by the farmer can generally mix a grain ration which is as good and costs less.

Wheat bran is a grain which is readily taken by young calves. Inasmuch as one of the essential points is to induce the calf to eat grain as early as possible, bran in many cases is one of the ingredients in the mixture. Corn, a feed very commonly found on the farm, has an excellent physiological effect upon cattle of all ages and to a great extent may take the place of the fat removed from the milk. It is therefore one of the very best grains to use with skim milk. Experiments in Virginia tend to show that corn fed to calves should be cracked rather than finely ground. Cracked corn and wheat bran therefore should be the basis of the feed mixture. Ground oats are very good for the purpose, but they are not grown on the farm so commonly as corn and in many cases cost much more per unit of feed than corn and bran. The following mixtures are recommended:

- (1) Three parts cracked corn and 1 part wheat bran.
- (2) Three parts cracked corn, 1 part wheat bran, and 1 part ground oats.
- (3) Three parts cracked corn, 1 part wheat bran, 1 part ground oats, and 1 part linseed meal.
- (4) Five parts cracked corn, 1 part wheat bran, 1 part ground oats, and 1 part blood meal.
- (5) Oats, ground.

When the calf is in its second week it should begin to receive grain, and when one month old it should eat about half a pound a day. After this time the quantity of grain may be gradually increased, feeding the calf all that it will take until 3 pounds a day is reached; this will probably be some time during the third month. Grain when fed with separated milk should never be put into the milk. It is questionable whether the preparation of grain in any way, such as soaking or boiling, is advisable under any circumstances. Grain should be furnished in separate feed boxes placed so that it can not be soiled by the droppings of the calf, but at the same time where the calf can get at it readily. There should be no corners in which wet feeds may ferment, and the utmost care should be taken to keep the grain fresh and clean at all times.

MILK SUBSTITUTES.

In dairy herds in which the entire output is sold as whole milk at high prices there is a strong demand for feeds to take the place of the milk fed to the calves. While it is probably not practicable to take calves two days old from the cows and raise them entirely without milk, some skillful feeders have been able to approximate these conditions. The time at which calves can be put on milk substitutes depends upon the same factors as in the use of separated milk, namely, the breed, development, and vigor of the calves, etc. It is hardly safe, as a rule, even with the most vigorous ones, to attempt to put them on milk substitutes alone within one week after birth; and with calves below the normal in vigor, some milk for two weeks or more may be necessary to raise them. In supplying a substitute for milk an attempt is usually made to use a liquid the composition of which resembles milk as much as possible. The following milk substitutes are among those in use:

BEAN SOUP.

Bean soup for calf feeding is prepared as follows: Parboil the beans in soda and drain the water off, add water and boil the beans until soft, then press through a colander. A quarter of a pound of beans in 4 pints of water constitutes one feed at first. This should be gradually increased until the calf consumes 1 pound of beans at a feed, on the basis of two feeds a day.

ENGLISH PREPARATION NO. 1.

Wheat flour, 1 pound; flaxseed meal,¹ 2 pounds; linseed meal, 1½ pounds. Stir ¼ pound of the mixture into 6 pints of boiling water for one feed (twice a day) at first. Gradually increase until the quantity is doubled.

ENGLISH PREPARATION NO. 2.

Linseed meal, 2 pounds; oatmeal, 2 pounds; flaxseed meal, 1 pound. Mix 1 pound with 7 pints of boiling water, and allow to stand overnight. Next

¹ In preparing flaxseed or linseed for calves, it should be boiled with water or very thoroughly scalded. If merely soaked in water (cold or warm) the conditions favor the production of a poison. On the other hand, if it is fed whole or simply crushed there is no risk of poison.

morning take one-half of the mixture, add water enough to make 5 pints; boil for 10 minutes, and add $\frac{1}{4}$ teaspoonful of salt and 2 teaspoonfuls of sugar. This makes one feed for the first few days that the calf is put on this ration and fed twice a day. Gradually increase until quantity is doubled.

HAYWARD'S CALF MEAL.

(As prepared and used by H. Hayward at the Pennsylvania Agricultural Experiment Station, State College, Pa.)

Flour, 30 pounds; coconut meal, 25 pounds; nutrium or dried skim milk, 20 pounds; linseed meal, 10 pounds; dried blood, 2 pounds. One-half pound of this mixture is stirred into 3 pints of boiling water, and when sufficiently cool constitutes one feed when the calf is fed twice a day. This is the ration at the start; the quantity is gradually increased as for the English preparations.

One of the objections to this mixture is that some of the ingredients are not readily obtained in all sections of the country.

LINDSEY'S CALF MEAL.

(As prepared and used by J. B. Lindsey at the Massachusetts Agricultural Experiment Station, Amherst, Mass.)

Ground oat flakes, 22 pounds; flaxseed meal, 10 pounds; flour middlings, 5 pounds; fine corn meal, 11 pounds; prepared blood flour, $1\frac{1}{2}$ pounds; salt, $\frac{1}{4}$ pound. The gruel is prepared in the usual way, by adding a little cold water to the dry meal and then about 5 pints of boiling water for each half pound of meal. The mixture should be allowed to stand until cool, and always warmed to 90° or 100° F. before feeding. The directions for feeding are the same as for Hayward's meal.

SKIM-MILK POWDERS.

One pound of powder is mixed with a small quantity of cold water to prevent the formation of lumps, then stirred into 9 pounds of boiling water and fed in the same proportion as milk.

The quantity of this powder available for calf feeding at a cost within the reach of the farmer is limited. First-grade skim-milk powders cost too much to feed to calves. In the manufacture of skim-milk powder, however, a limited quantity of low-grade product is made, not good enough to sell for bakers' or confectioners' use, which usually can be purchased at a price that permits its use in calf feeding. Under present conditions it is questionable whether these powders have wide use in calf feeding.

In feeding all milk substitutes the quantity fed should be substantially the same as when separated or whole milk is fed. If, however, there are indications of scours, the quantity should be reduced. The following may serve as a guide in using milk substitutes for feeding strong, vigorous calves:

First week.....	Whole milk.
Second week.....	Whole milk.
Third week.....	Three parts whole milk, one part gruel.
Fourth week.....	Three parts whole milk, one part gruel.
Fifth week.....	Whole milk and gruel, equal parts.
Sixth week.....	Whole milk one part, gruel three parts.
Seventh week.....	All gruel.

All milk substitutes lack a great deal of being as satisfactory as either whole or skim milk, and milk has to be very high in price to

justify the use of milk substitutes during the first two weeks of the calf's life.

Grain and roughage should be fed with milk substitutes the same as with separated milk.

QUARTERS FOR CALVES.

Small calves should not be bumped and jostled about. An easy way to prevent this is to provide small pens, not less than 4 by 6 feet in size, in each of which a calf may be kept for the first two weeks. The pens should be fitted with feed boxes for grain and racks for hay. After the calf is old enough to run with the others it is placed with them in a larger pen. Stanchions are fixed on one side of this pen to provide for the separate feeding of the calves, so as to

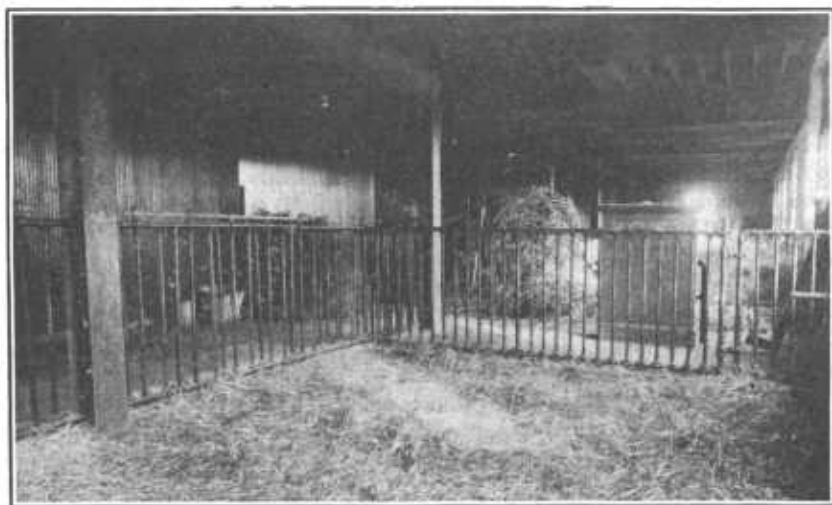


FIG. 2.—Good quarters for calves, well bedded. The metal railing on the left comprises stanchions, with feed trough just beyond (shown more clearly in fig. 1).

insure that each receives its proper share. Racks for hay should also be placed within easy reach of the calves.

Too much emphasis can not be laid upon the necessity of having light, dry quarters for the calves. Bedding always should be abundant and should be changed often, in order that the pen always may be dry. Lack of attention to these matters is very likely to allow the development of the various calf diseases. Good quarters for calves are shown in figures 1 and 2.

After the calf is a few weeks old, it can stand considerable cold if it is kept dry and has dry quarters. Provision also should be made to allow the calves plenty of exercise. A small paddock or pasture adjoining the calf stables is excellent for this purpose. Except for the very young ones, calves may be let out in the exercise lot for a short period each day when the weather is not too cold or stormy.

STANCHIONS FOR CALVES.

If the calves are kept together in a large pen it is very difficult to feed them by hand unless they are tied. When they are loose the milk

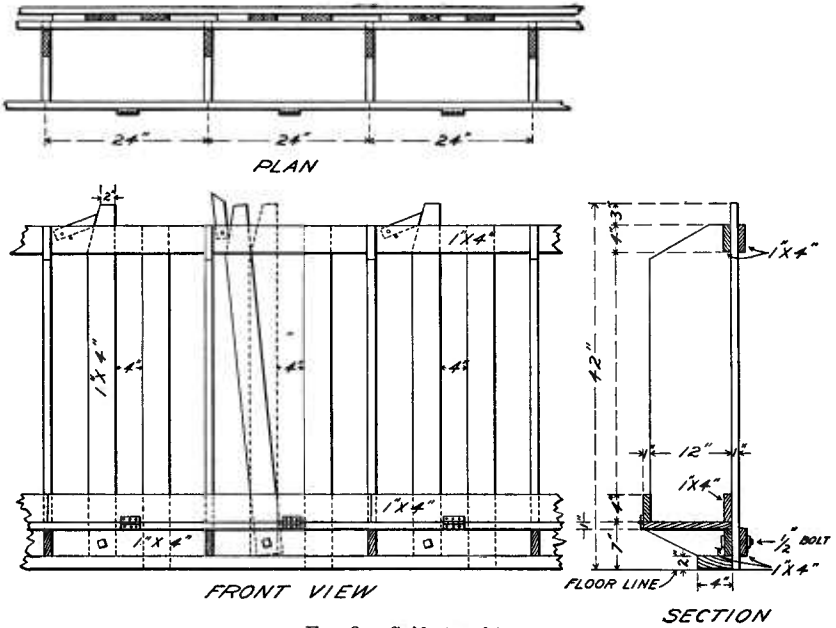


FIG. 3.—Calf stanchion.

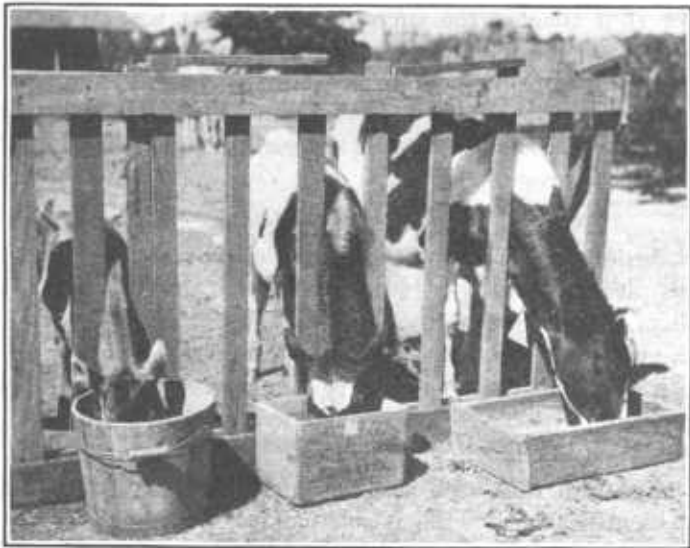


FIG. 4.—Calves feeding, showing use of stanchions.

often is spilled, and the larger calves get part of the smaller ones' share. Very simple stanchions may be constructed to prevent losses

of milk and insure the equal distribution of the feed. To prevent the calves from sucking one another they should be kept in the stanchions for some time after feeding.

A calf stanchion may be constructed of cheap or scrap lumber. It is usually 36 to 40 inches high and has a 4-inch space for the calf's head. A design for a practical stanchion is shown in figure 3. Figure 4 shows stanchions in use.

PREVENTION OF HORNS.

In the average dairy it is better that cows be without horns, as the danger of their hooking one another is thus prevented. Only in pure-bred herds, where the appearance of the herd is considered important from a show or sale point of view, is there any justification for allowing horns to grow. It is much easier to prevent the growth of horns than to remove them.

The points that ultimately will develop into horns can be felt as small buttons imbedded in the skin. The prevention is most effective if the treatment is applied when the buttons are just large enough to be felt, which is usually between the third and the seventh days. To prevent their development, the hair should be removed from the horn buttons; a stick of caustic potash or soda, wrapped in paper to protect the hands of the operator, is then moistened with water and rubbed on each horn button two or three times, allowing the caustic to dry after each application. Care should be taken to apply the caustic, which should not be too moist, to the buttons only, for if it touches the surrounding skin it will cause unnecessary pain. Immediately after the application the calf also should be protected from rain, in order to prevent the caustic from spreading. If the operation is carefully performed the horns will make no growth. If scurs or horn growths appear, it is an indication that the caustic was not properly applied.

WATER AND SALT.

Many feeders fail to realize the importance of providing the young calf with plenty of water. It is a mistake to think that because the calf drinks milk it does not need water. After the calf is two weeks old it should have access to plenty of fresh, clean water at all times, and when it is old enough to eat roughage it should have access to salt.

MARKING CALVES FOR IDENTIFICATION.

It is important that each calf be marked plainly so as to permit of easy identification. This is particularly necessary in pure-bred herds, and should be done in all herds of any considerable size, even if composed of grades.

A number of marking systems have been in general use, among which the following are some of the most common: Leather strap

around the neck, with brass tag attached; ear tags of various forms; notches and holes in the ears; and tattoo marks in the ears.

The leather strap with tag around the calf's neck is a convenient method of marking. The advantages of this system are that the number may be observed readily and no disfiguration of the animal is necessary. The cost, however, is somewhat higher than that of other systems because of the first cost of the straps and tags and because their renewal is sometimes necessary.

Ear tags of various materials and forms are perhaps the most common means of identification; these tags are inexpensive and easy to attach, but have the disadvantage of being easily torn from the ears.

Marking animals by means of holes and notches in the ear is practiced in many herds, and a number of systems are in use for this purpose. Figure 5 illustrates such a marking system.

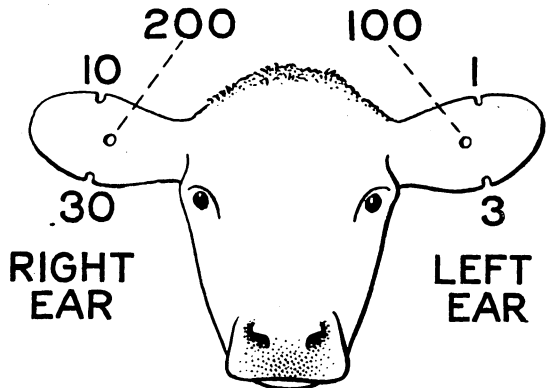


FIG. 5.—Illustration of a notch method of marking calves for identification.

The notches are made with a punch specially designed for the purpose. Care should be taken to make them so that they can be readily detected in running the fingers along the edge of the ear. Under no circumstances should they be made with a knife, as the outlines of a small cut made by such an instrument become obliterated or may be confused with the slight natural indentations of the ear as the animal grows older. It is also very difficult to make the cut of the right size with a knife, and if too large the animal is greatly disfigured. This system, while causing a slight disfigurement of the animal, is very simple, and if rightly done the notches are scarcely noticed. A serious disadvantage, however, is that mistakes in marking can not be easily corrected. To illustrate the use of this method the following examples are given: No. 7, two notches on lower edge and one notch on upper edge of left ear; No. 46, one notch on lower edge of right ear, one notch on upper edge of right ear, and two notches on lower edge of left ear; No. 152, one notch in center of left ear, one notch on lower edge of right ear, two notches on upper edge of right ear, and two notches on upper edge of left ear.

The identification of an animal by means of tattoo marks in the ears has become quite common in recent years. This system of marking animals has the advantage of not disfiguring the animal, and if

properly applied the tattoo is permanent, so that the chance of losing the identity of the animal by the loss of the tag is greatly lessened. On the other hand, it requires close inspection to distinguish the marks in the ears.

CALF DISEASES.

SCOURS FROM INDIGESTION.

Diarrhea, or scours, is probably the most common disease of calves. Great care must be taken at all times to prevent this condition, as it always hinders the growth and development of the animal and in addition is often hard to cure. This disease is the result of disturbance of the digestive apparatus of the calf and may be caused in a number of ways, the more important of which are the following: Irregular feeding, overfeeding, sudden change of feed, fermented feeds, feeding dirty or sour milk or milk of diseased cows, the use of dirty milk pails or feed boxes, and damp, dirty stables. As soon as scours is discovered it is best to separate the affected calf from the others and carefully disinfect the pen. The feed should be reduced immediately at least one-half, milk pails cleaned and sterilized, feed boxes cleaned and disinfected, and any other causes mentioned above eliminated.

A number of preparations are used to treat this disease, a few of the more common of which are blood meal, a teaspoonful at a feed; white of egg; limewater, etc. A dose of four drops of formalin to each quart of milk has been used to advantage, and a drench of three ounces of castor oil followed by a teaspoonful of a mixture of one part salol and two of subnitrate of bismuth also is recommended. Ordinary white clay, mixed with water to the consistency of thick cream, and given in doses of quarter or even half a pint, three times a day, has been used recently, with excellent effect.

WHITE SCOURS.

White scours, or infectious dysentery of the calf, generally affects a number of calves in a lot, and first appears shortly after birth as a diarrhea with light-colored, offensive droppings. During the course of this disease the calf wants to sleep all the time and can not be induced to suck or drink. It is also very much weakened by the disease and usually dies within three or four days. As far as the department knows, there is no specific method of curing the disease. Ordinary white clay, mixed with water to the consistency of thick cream, and given in doses of a quarter or even half a pint, three times a day, has been found to be very valuable. Manufacturers of biological products, however, are now selling a potent serum which they claim to be effective in both prevention and cure.

Prevention consists in the use of sanitary precautions, such as clean, dry, and disinfected pens for calving, and careful disinfection

of the navel of the calf at birth, painting the cord with tincture of iodine, and tying it with silk thread. As this disease is of so serious a character that it may cause the loss of a season's crop of calves, the details for the control of an outbreak should be referred to the State live-stock official or to a qualified veterinarian in the community.

FEEDING AND MANAGEMENT OF YOUNG DAIRY STOCK.

FEEDING FROM SIX MONTHS TO ONE YEAR OF AGE.

As has been previously stated, it is a common practice among dairymen to feed skim milk until the calf is approximately 6 months of age. Usually the time of weaning depends upon the availability and cost of the milk.

When milk is fed in abundance it furnishes the greater part of the protein¹ necessary for the growth of the animal. If no milk is fed it becomes necessary for the protein to be provided from some other source. Probably this can be done most economically by the use of some legume, such as alfalfa, clover, soy beans, or cowpea hay. When hay of this sort is not available it is necessary to provide the bulk of the protein through a grain mixture. In either case, plenty of roughage should be supplied to the growing heifer at all times. During summer, when good pasture is available, the heifer needs no supplementary feed, although a little hay and grain are sometimes advisable late in the season to insure steady growth.

Part of the roughage should be silage, if it is available. A heifer of six months to one year of age will consume from 5 to 15 pounds of silage a day. The grain mixture used may be the same as mentioned for calf feeding (see p. 9); any one of Nos. 1, 2, 4, and 5, together with all the alfalfa, clover, or cowpea hay that the heifer will eat. In case no leguminous hay such as that just mentioned can be obtained, No. 3 is advised, because it contains more protein. Another excellent grain mixture, to be used when such hay is lacking, is composed of 2 parts of corn meal, 2 parts of linseed meal, and 1 part of bran.

The quantity of grain to be fed depends very largely upon the individual animal's growth and condition, as well as upon the price of the grain. Some feeders desire a rapid growth of the young animal, and for this reason feed heavily with grain, while others are satisfied with a slow growth and try to carry their young stock largely on roughage. Either extreme is unwise and a medium course between the two is advisable. A safe rule to follow is to feed 1 pound of grain for the first hundredweight of the heifer and $\frac{1}{2}$ pound for each additional hundredweight.

¹Protein is an important component of animal food; one of its chief constituents is nitrogen. It is necessary for the making of blood, muscle, skin, milk, etc.

FEEDING FROM ONE TO TWO YEARS OF AGE.

After the heifer reaches one year of age, the following rations are suggested: Corn meal, fed according to the rule just mentioned, together with all the alfalfa, clover, or cowpea hay that the animal will consume. If no leguminous hay is available, grain composed of 2 parts corn meal, 1 of bran, and 1 of linseed meal, gluten meal, or cottonseed meal, and 10 to 20 pounds of silage, together with all the dry roughage that the animal can consume, will be found to be adequate. Under ordinary circumstances a gain of at least a pound a day from the time of weaning to the time of first calving is a good average for a dairy heifer.

AGE TO BREED.

Ordinarily it is planned to have the heifer enter the milking herd between 24 and 30 months of age. No arbitrary time can be set, as this depends upon several factors, such as the size and condition of the animal and the breed to which she belongs. Undersized and ill-conditioned animals should be allowed more time to complete their growth and to improve in condition before entering upon the strain of calving and the ensuing lactation period. It is very important that the heifer make a good growth before she is bred, because after that time she will make little body growth until after she has completed her first lactation period.

If heifers are bred to a heavy bull, care should be taken to see that they are not permanently injured. Oftentimes a breeding rack is found to be of advantage; such a rack is inexpensive and easily constructed. A better plan is to use a young bull on the heifers, which eliminates danger of injury.

HANDLING YOUNG HEIFERS.

Young heifers should be handled as much as possible in order that they may not be shy when they enter the herd. A good plan is to bring the "springing" heifer up to the barn some time before she is due to calve and get her accustomed to the halter and stanchion and to being handled. A little care in this way often prevents considerable trouble after calving, and usually insures a gentle cow.

FALL CALVING ADVISABLE.

From the standpoint of the dairyman who raises his calves, fall calving is desirable under most conditions. Under this system the calf receives milk for the first few months of its life, and at the time when it becomes necessary to wean it a succulent feed in the form of pasturage is available. As a result the calf usually makes uninterrupted gains at a minimum cost. Fall calving has the additional advantage that the bulk of the milk is produced at a time when prices

are the best and when it is easiest to maintain a steady flow, and the calves are of the right age so that with careful management they may be bred to freshen in the fall or winter for the first time. This is desirable from the point of view of obtaining the longest milking period in the young heifer.

THE YOUNG BULL.

The bull calf should be separated from the heifers at about 4 months of age. His treatment and feeding should be identical with that of the heifer except that to get maximum growth he should receive a little larger quantity of grain. If properly handled, the young bull is ready for light service at the age of from 10 months to a year. Too much service before he is 2 years of age will do him permanent injury, which, of course, should be avoided. It is important that he be properly trained to halter, as this will make him much easier to handle when he is old. At 6 months of age a ring should be put into his nose.

Among some breeders it is the practice to remove the bull's horns at 2 years of age. It is asserted that this tends to tame him and prevent him from becoming vicious. One thing that should always be kept in mind is that exercise is essential to the proper development of a young bull and to the health and vigor of a mature one. A small paddock, with a shed for protection against stormy and windy weather, will give him room for plenty of exercise and keep him in good condition. Two bulls, if dehorned, may be kept together to advantage, as they exercise each other. Precautions should be taken to see that each receives his proper portion of feed.

**PUBLICATIONS OF U. S. DEPARTMENT OF AGRICULTURE RELAT-
ING TO DAIRY FARMING.**

AVAILABLE FOR FREE DISTRIBUTION BY THE DEPARTMENT.

Milk Fever and Its Treatment. (Farmers' Bulletin 206.)
Some Common Disinfectants. (Farmers' Bulletin 345.)
Dehorning of Cattle. (Farmers' Bulletin 350.)
Care of Milk and Its Use in the Home. (Farmers' Bulletin 413.)
Tuberculosis. (Farmers' Bulletin 473.)
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Making and Feeding of Silage. (Farmers' Bulletin 578.)
Homemade Silos. (Farmers' Bulletin 589.)
Clean Milk: Production and Handling. (Farmers' Bulletin 602.)
Ice Houses and Use of Ice on Dairy Farm. (Farmers' Bulletin 623.)
Plan for a Small Dairy House. (Farmers' Bulletin 689.)
The Feeding of Dairy Cows. (Farmers' Bulletin 743.)
Cow-testing Associations. (Bureau of Animal Industry Circular 179.)

**FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING
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Dairy Herd, Its Formation and Management. (Farmers' Bulletin 55.) Price,
5 cents.
Breeds of Dairy Cattle. (Farmers' Bulletin 106.) Price, 5 cents.
Influence of Type and of Age Upon Utilization of Feed by Cattle. (Bureau of
Animal Industry Bulletin 128.) Price, 30 cents.
Maintenance Rations of Farm Animals. (Bureau of Animal Industry Bulletin
143.) Price, 15 cents.
Cost of Raising a Dairy Cow. (Department Bulletin 49.) Price, 5 cents.