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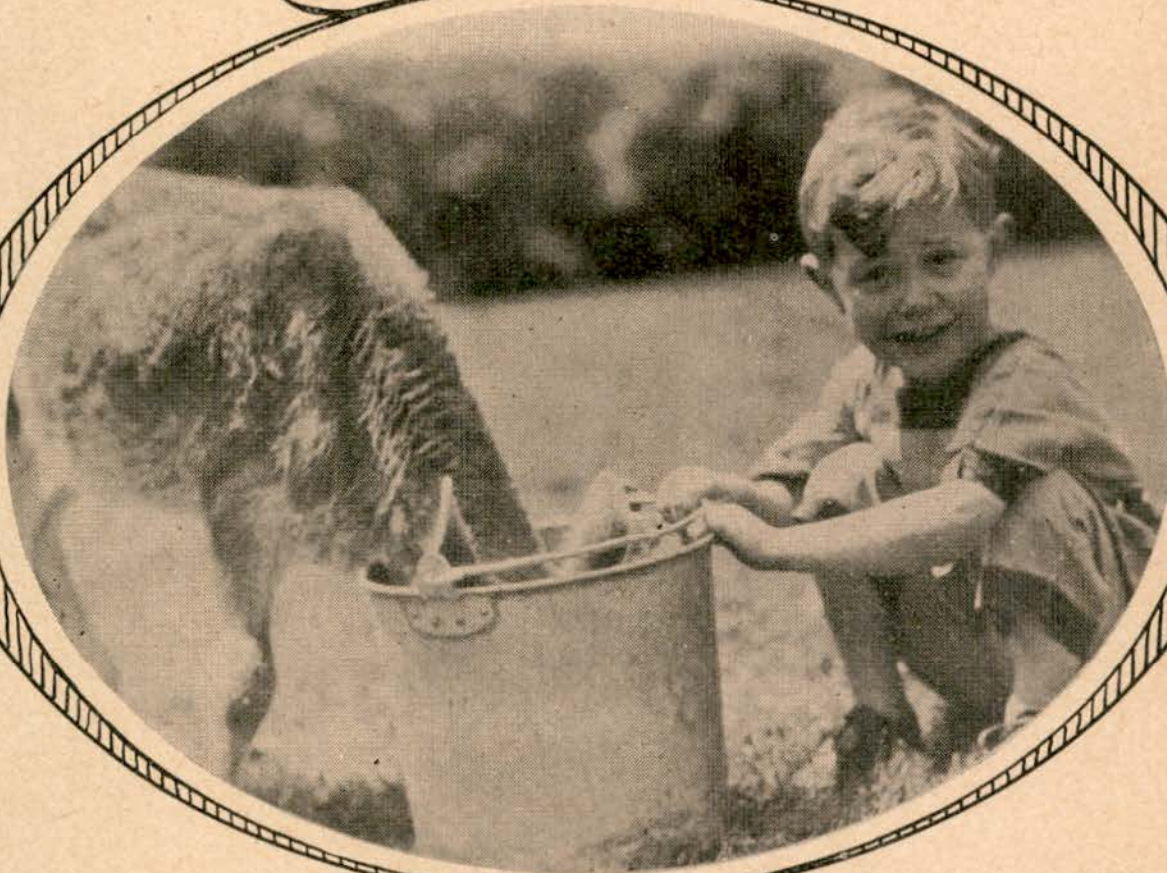
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Circular 30

July, 1925

Dairy Calf Care AND Management

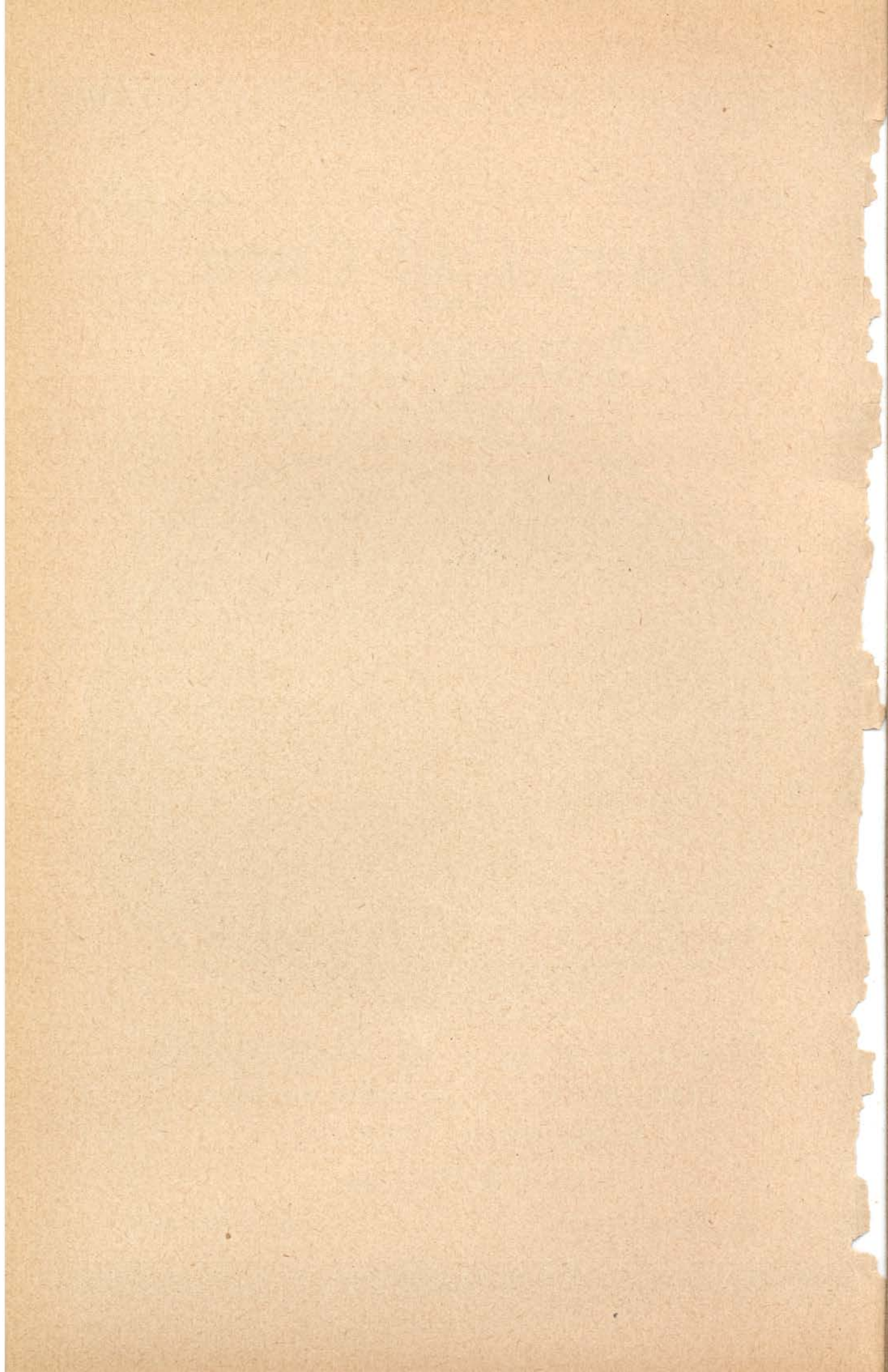
By H. P. DAVIS & R. F. MORGAN



The University of Nebraska
COLLEGE OF AGRICULTURE
Experiment Station
LINCOLN

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Director



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Dairy Calf Care and Management

H. P. DAVIS AND R. F. MORGAN

Calf raising begins before the calf is born. A cow that is healthy and in good physical condition will, in all probability, drop a strong, vigorous calf. The feeding and care of the cow before calving is therefore of the greatest importance for the future development of the calf.

CARE OF COW BEFORE FRESHENING

LIBERAL FEEDING NECESSARY

If possible, the cow should be dry at least a month and preferably six weeks before the next freshening. This allows her to rest from the hard work of producing milk and to prepare herself for a forthcoming milking period. During this time, she should be well fed, in order that a reserve may be established. In other words, she should have a vacation on full feed. It is usually a good practice to have the cow in such good flesh before calving that she appears to be reasonably fat. In the case of a good milk cow, this reserve will be milked off readily after freshening. During her dry period it is particularly desirable that the cow have plenty of legume hay, and if possible, access to good pasture. In the case of a high producing cow, it is also advisable to feed liberally of a grain mixture that contains much lime and phosphates.¹ Wheat bran contains a large proportion of phosphates and should therefore have a prominent place in the ration for the dry cow. A mixture of corn, oats, and wheat bran, equal parts, is very satisfactory.

PREPARATION OF CALVING STALL

In the winter time, or during stormy weather, the cow should be placed in a clean, comfortable, quiet, well-bedded box stall a week before freshening. In preparing the stall, all litter or bedding should be removed and the walls and floor sprayed with a 5 per cent solution² of carbolic acid or some other standard disinfectant. Afterwards clean, dry bedding should be kept in the stall to insure for the new-born calf clean surroundings. In pleasant weather the cow ought to be out-of-doors during the day in order to get proper exercise.

¹ See Nebraska Agricultural Experiment Station Circular 29, *Feeding the Dairy Cow*.

² One ounce to 5 gallons of water is approximately a 5 per cent solution.

CALVING ON PASTURE

If the cow is on pasture and can get off by herself, it is not necessary to use a box stall, as a clean, grassy spot is ideal for calving. There is danger, however, that she may require assistance, which might not be available.

PREPARATION FOR FRESHENING

The week before the cow is due to calve, all grain fed should be of a cooling and laxative nature. Bran and ground oats, equal parts, or bran alone, will make a very satisfactory grain feed. The quantity fed daily, ordinarily, should not exceed six pounds. Silage and legume hay should also be fed in liberal quantities if available. Every effort should be directed toward keeping the cow in good physical condition, preferably with the bowels a little laxative. If the ration is not sufficiently laxative in its effect, a pint to a quart of raw linseed oil, given as a drench, is useful. One-half pound of Epsom salts dissolved in a quart of warm water may be used instead.¹

After the cow freshens, a bran mash is desirable. In winter this should be warmed. Plenty of clean water of moderate temperature should always be available, and immediately after calving a pail of warm water should be conveniently placed for the cow to drink. Salt should always be at hand and may compose as much as one per cent of the grain mixture.

CARE OF THE COW AND CALF AT FRESHENING

CARE OF THE UDDER

At parturition (freshening) the udder of a good milk cow is often greatly swelled and inflamed. While the udder may be distended and of enormous size, only in rare instances is it necessary to milk a cow before freshening. Even then, milk out only a very little from each quarter — just enough to relieve the pressure. When the udder is very hard and inflamed, applications of cloths wrung out of hot water are very useful in relieving this condition. Care must always be taken to thoroly dry the udder after the applications, especially in cold weather. Rubbing or massaging and the application of camphorated oil, turpentine and lard,* or

¹ A drench is ordinarily given by means of a long-necked bottle that is thrust in the cow's mouth, the mouth of the bottle being kept on top of the tongue to prevent choking.

* One tablespoon of spirits of turpentine added to five tablespoons of lard.

sweet oil, are usually very helpful in relieving the condition. Whatever is used on the udder should be thoroly rubbed in to give best results. In the winter plenty of good bedding is necessary to prevent the cow from taking cold in the udder.

Milk fever (parturient paresis) often attacks heavy milking cows shortly after freshening. As a precaution against this, it is well not to milk the cow completely for at least forty-eight hours.

INDICATIONS OF APPROACHING CALVING

Usually from twenty-four to forty-eight hours before calving, the udder becomes greatly distended and inflamed, and the muscles and tendons relax, sinking on either side of the rump next the tailhead. At this time, the cow becomes very restless and should be left alone.

CARE OF NEWBORN CALF

If an attendant is present at calving, care should be taken to see that the foetal membrane (afterbirth) is immediately removed from the nose of the calf in order that it may start breathing. Rubbing the throat of the newborn calf helps to remove the mucus that is often present, making breathing easier. The licking of the calf by the cow is very important, since it dries the animal, starts respiration, and stimulates the circulation. If the cow does not lick the calf, rub it vigorously against the hair with a clean, dry cloth or towel. As soon as possible after birth, apply tincture of iodine to the navel of the calf externally, in order to prevent infection. This may be done by means of a cotton swab attached to a stick. If possible, pour a little of the tincture of iodine in the end of the navel cord. Do not tie the navel cord, as it seldom can be done in time to do any good. Powdered alum or powdered boric acid may be sprinkled on it to dry it more rapidly.

CARE OF COW AFTER CALVING

Shortly after calving, the membranes composing the afterbirth should be passed by the cow. If they are not gotten rid of inside of a day, it will probably be necessary for some skilled person or a veterinarian to remove them. This should be done about the second or third day. Inexperienced persons should not attempt to remove the afterbirth.

CARE OF CALF — FIRST AND SECOND WEEKS**COLOSTRUM**

It is essential that the calf receive the first milk or colostrum from its mother. Colostrum is thick, very yellow in color, and contains nearly 6 times the amount of protein contained in ordinary milk. The proportion of albumin, so useful for growth, is greater. The colostrum also contains much more ash or minerals for building bone. The purpose of the colostrum is to furnish the newborn calf with a laxative and tonic to start its body organs to functioning properly. It also supplies the kind of concentrated nourishment needed by the newborn calf. The deep yellow color is not due to a large quantity of fat, since colostrum contains about the same amount of fat as ordinary milk. If for any reason it is not possible for the calf to get the first milk or colostrum, it should be given one ounce of castor oil as soon as possible after birth. Should the mother be unable to supply milk to the calf, it should receive the milk from a cow not too near the end of her milking period.

SEPARATION FROM COW

A common practice is to leave the calf with the cow for the first four days, removing it the fifth morning, when, under most circumstances, the milk is considered suitable for human use. This plan allows the calf to be with the cow during the time when the udder is inflamed. The calf is usually quite effective in reducing the swelling. If the cow's milk is unsuitable for human use, the calf may remain with her for a longer period; but the longer the calf is allowed to remain with the cow, the harder it will be to teach it to drink. Following another method, the calf may be separated from the cow after having sucked once and thereafter fed from a pail. In either case the calf should have its mother's milk for the first week. After that it may be changed to the milk of any cow that is not too far along in her milking period.

TEACHING CALF TO DRINK

If at first a calf does not drink readily from a pail, it is advisable to keep it without food for at least twelve hours. It is then hungry and is usually willing to try drinking. Warm whole milk, fresh from the cow, should be measured or preferably weighed into a clean pail. If calf stanchions are available, place the calf's head in the stanchion, then place two fingers in the calf's mouth and draw its mouth

down into the pail of milk. Usually the calf will suck the milk between the fingers and after getting a taste of the milk will often learn to drink without further coaxing.

In case calf stanchions are not available, a common way to teach the calf to drink is to straddle its neck, holding the calf firmly between the knees, and proceed as with the stanchions. Occasionally a young calf will not learn to drink readily, in which case it may be fed with a bottle, with or without a nipple.

QUANTITY OF MILK TO FEED

The quantity of milk that a calf will do well on varies according to the size, breed, and individuality of the calf. In

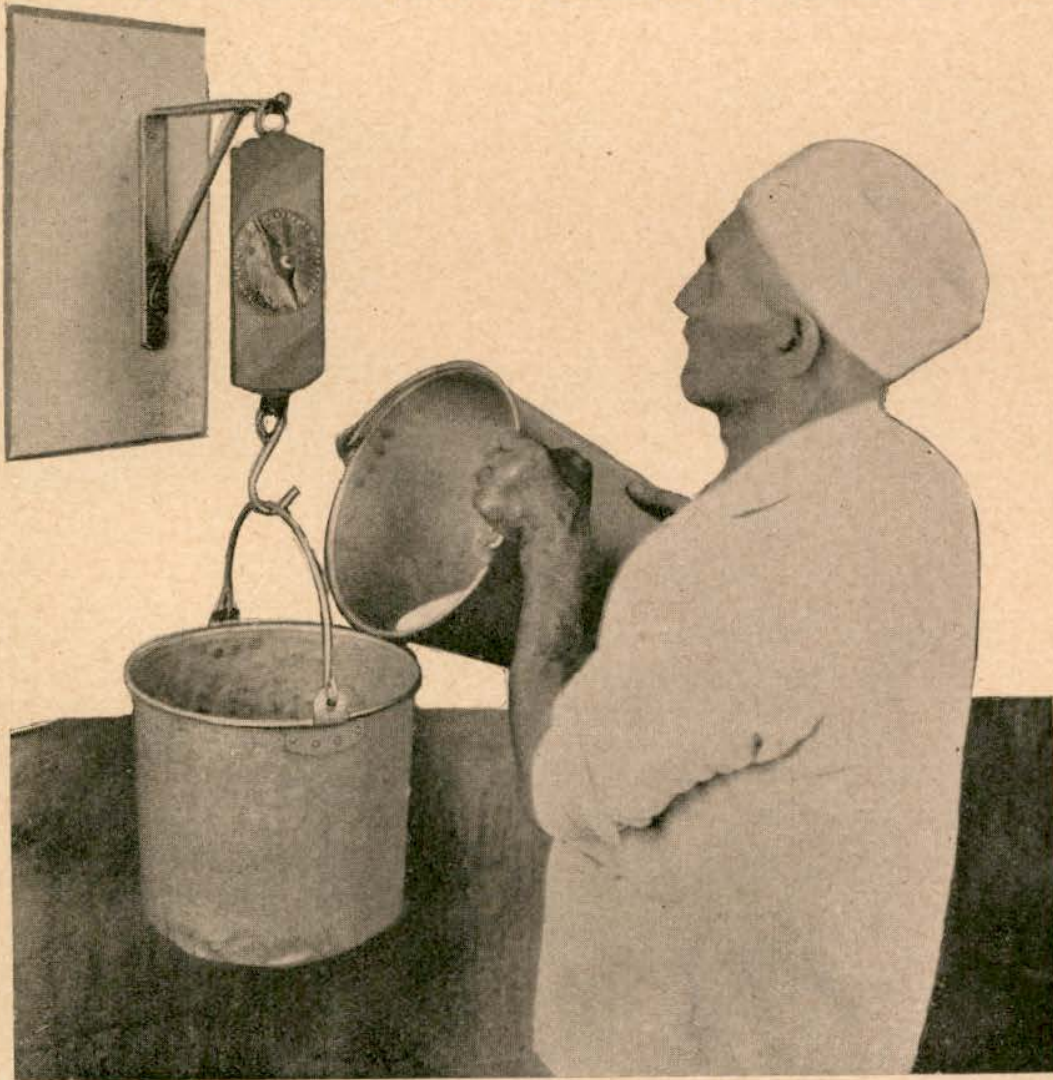


FIG. 1.— Weigh the milk for calves

general, for Jersey or Guernsey calves, 1 pound of milk daily for each 10 pounds of live weight is a safe quantity. Ayrshire, Holstein, Brown Swiss, and Shorthorn calves may be fed 1 pound of milk a day for each 8 pounds of live weight. If the calf is not weighed, the quantity fed the first 2 weeks may be as follows:

TABLE 1.—*Milk feeding first two weeks.*

	Feeding twice daily		Feeding thrice daily	
	One feed	Total per day	One feed	Total per day
	Pounds *	Pounds	Pounds	Pounds
Jersey	2.5 to 3.0	5 to 6	2.0 to 2.5	6.0 to 7.5
Guernsey	2.5 to 3.0	5 to 6	2.0 to 2.5	6.0 to 7.5
Ayrshire	3.0 to 3.5	6 to 7	2.5 to 3.0	7.5 to 9.0
Shorthorn	4.0 to 4.5	8 to 9	3.5 to 4.0	10.5 to 12.0
Brown Swiss..	4.5 to 5.0	9 to 10	3.5 to 4.0	10.5 to 12.0
Holstein	4.5 to 5.0	9 to 10	3.5 to 4.0	10.5 to 12.0

* One quart of average milk weighs 2.15 pounds; one pint weighs 1.075. Practically, a pint equals a pound.

A calf fed 3 times daily can assimilate more food than when fed only twice and many feeders prefer to feed all calves 3 times a day for the first few weeks. The quantities suggested are believed to be safe amounts for feeding the average calf the first 2 weeks of its life.

PRECAUTIONS IN FEEDING WHOLE MILK

Do not overfeed.—During the first few weeks, great care should be taken to prevent any digestive troubles, for a calf properly started will grow faster and develop much better. A safe rule in feeding is always to have the calf a little hungry when it has finished drinking its milk.

Have milk at proper temperature.—To be easily digested, milk that is fed to young calves should be at about body temperature. Milk drawn from the cow is of course at the ideal temperature, and if possible should be fed immediately. If the surrounding temperature is so cold as to chill the milk before it can be fed, it should be warmed to a temperature of 95° F. by setting the pail in a vessel of hot water before being fed. It is very important that the milk fed to calves be of the proper temperature. Do not depend upon guesswork — use a thermometer! Cold milk will almost

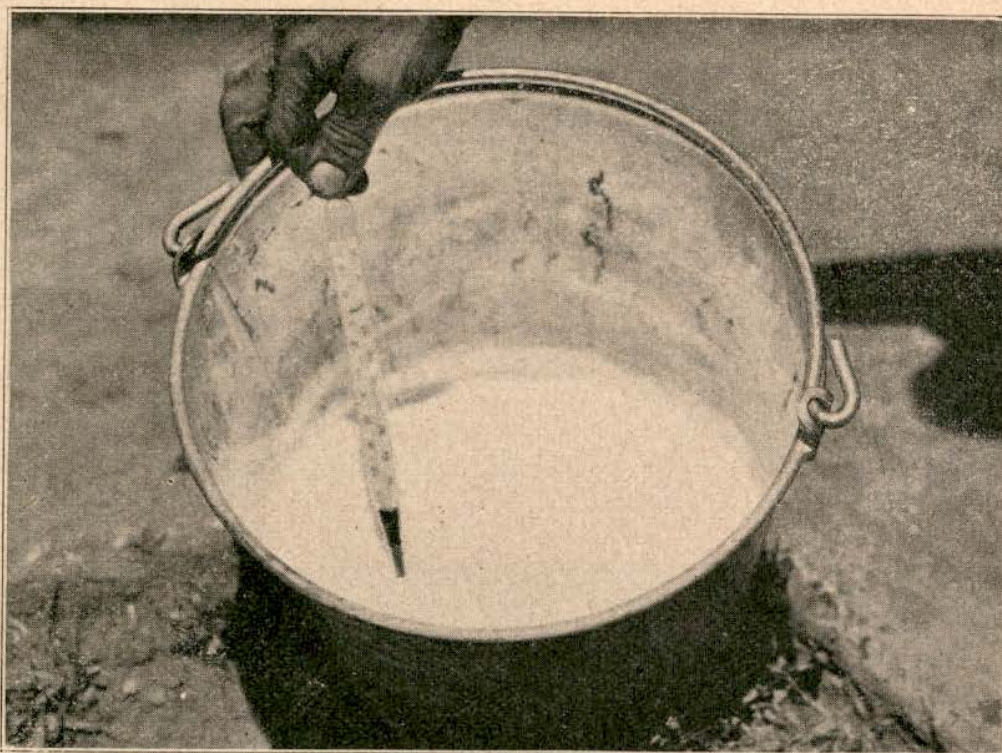


FIG. 2.—Take temperature of milk for calf feeding

always cause digestive troubles, resulting in scours. Digestive troubles tend to stop the calf's growth and hinder its getting a good start.

Weigh milk.—No one can accurately estimate with eye, the quantity of milk in a pail. Since the quantity fed young calves ought not to vary, each feed of milk should be weighed on a spring balance to insure that the same quantity be fed each time. Milk scales are very convenient for this purpose.

Too rich milk.—Some cows, especially of the Jersey and Guernsey breeds, produce milk that is too rich for their calves. In such cases it is advisable to use the milk from a cow giving milk which is not so rich in butter fat. In case milk from such a cow is not available, it is well to add one-fourth warm skim milk to the richer milk, feeding the same quantity as before.

CLEANLINESS

Pails and mangers.—Cleanliness is an all-important precaution in calf feeding. Clean feeding pails are absolutely essential to successful calf raising. They should be washed

after each feeding as carefully as milk utensils and sterilized if possible. Dirty pails invariably cause digestive troubles, with attendant poor condition and lack of growth. All mangers and feed boxes should be kept scrupulously clean. At least once each week, all feed should be removed and the boxes and mangers scraped and brushed, particularly to remove refused feed from the corners. Rounded corners in the feed boxes are a great help in making these easy to clean.

Stalls.— Each day, all wet or moldy bedding should be removed and the remaining straw or litter piled to one side to allow the pen to dry, and sun if possible. Plenty of bedding, straw, corn stover, or shavings should be used, especially in the winter, to insure the calf's always being on dry litter and not on the stall floor.



FIG. 3.— Applying caustic to calf's head to prevent the growth of horns

PREVENTION OF HORNS

Horns on dairy cattle serve no useful purpose. It is easier and less troublesome to prevent their growth than to remove them later on. If this is to be done, the calf's horns should be treated between the third and fifth day. To prevent their growth proceed in the following manner: First clip the hair from a small spot around each horn button, a little knob that may readily be felt with the fingers. Then just inside the outer edge of the clipped area make a thick application of

vaseline or petroleum jelly. A small pencil or stick of fresh caustic potash or caustic soda is next wrapped in paper to protect the hands of the attendant. One end of the caustic, which is allowed to extend beyond the paper, is moistened in water and rubbed in a circular motion against the horn button until the skin is burned thru and the button destroyed. Usually the stick is applied alternately to each button so as to allow the caustic time to take effect. When properly done, there should be a spot the size of a dime above each horn button where the skin is completely burned thru. Care should be used not to moisten the caustic too much or to get it on any other part of the animal, as it will burn the hide. When finished, powdered alum or powdered boric acid may be sprinkled over the burned spot to prevent bleeding.

After treating, do not turn calves out into the rain, for the caustic may run down and burn the head. The calves should be kept separate for a few hours after application, to prevent licking by the mothers or by other calves. If this is not done, bad burns may result.

A paste for the prevention of horns may be purchased and used by those who prefer it to the stick of caustic. Directions should be followed closely if good results are to be obtained. Care must be taken, however, to see that the calf does not scrape off the paste for 20 minutes or before it effectively destroys the horn buttons.

CARE OF CALF — THIRD AND FOURTH WEEKS

QUANTITY OF MILK

At the beginning of the third week if the calf is doing well the quantity of milk fed daily may be increased 2 pounds. This increase should be made at the rate of not over a pound at a feed. In the case of especially vigorous calves, the increase may be three or four pounds, but two pounds is a safe quantity. The rate-of-feeding per 100 pounds of live weight may be followed as during the first two weeks. After the second week, feeding twice a day is sufficient for all but very weak calves. It is always safe to underfeed a young calf, but never safe to overfeed. See Table 2 for quantities of milk to feed by weeks.

If several calves are kept in the same pen, care must be taken to prevent their sucking each other after drinking milk. If stanchions are available, the calves may be left in them for twenty or thirty minutes after feeding milk and be given a little grain or hay to eat. This will usually prevent

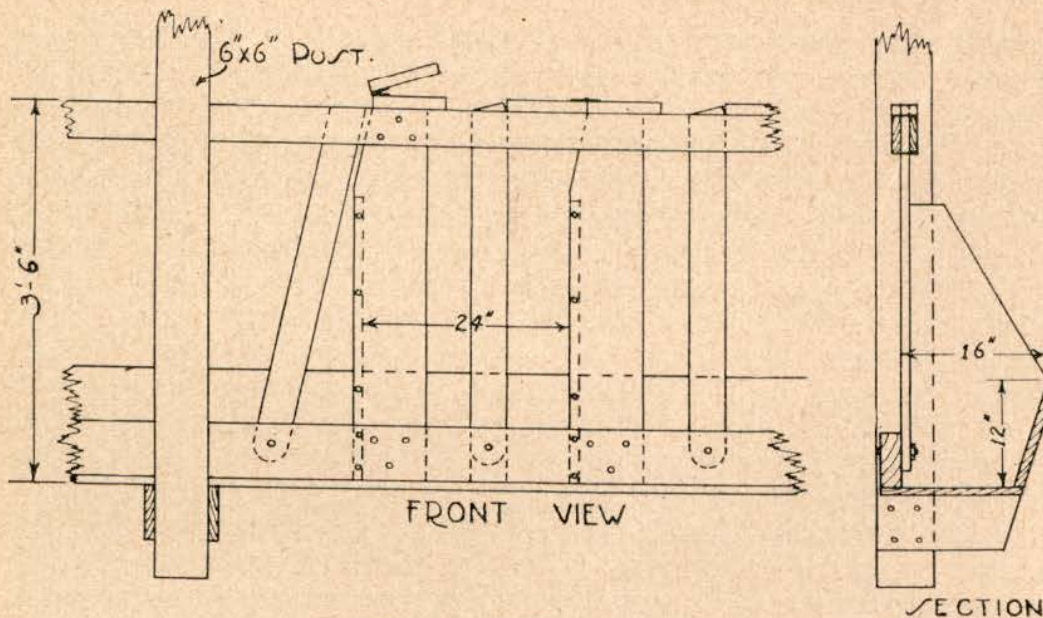


FIG. 4.— Calf stanchions

most of the sucking. Sucking is undesirable in that it may be the cause of unbalanced udders later on. It may also cause frozen teats or ears in the winter time.

SUBSTITUTION OF SKIM MILK

At the beginning of the fourth week, the change from whole milk to skim milk may be commenced if the calf is growing and developing normally. This change should be gradual, a whole week being used to complete the substitution. The foam should be removed from the skim milk, as feeding foam often causes bloat, which may result in digestive troubles.

It may sometimes be possible to make the change from whole milk to skim milk more rapidly in the case of especially vigorous calves, but the plan suggested is a safe guide. When first added to the calf's ration it is especially important that the skim milk used be fresh from the separator and not colder than 90° F., since in young calves it is very easy to cause indigestion, resulting in scours. Skim milk differs from whole milk only in lacking the milk fat. Because of this fact there is often a tendency to feed more of it. After the first few weeks, skim milk, for all practical purposes, is as good as whole milk for calf feeding. The lack of fat may be supplied much more cheaply by grain or other feeds. If it is always remembered that the young calf is a baby and there-

TABLE 2.— *Milk feeding by weeks*

	Ist week	2nd week	3d week	4th week	5th week	6th week	7th week	8th week	9th week and thereafter
Breed of calf	Whole milk daily	Whole milk daily	Whole milk daily	Whole and skim milk daily	Skim milk daily	Skim milk daily	Skim milk daily	Skim milk daily	Skim milk daily
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Guernsey ..	6	6	8	10	12	14	16	18	20
Jersey	6	6	8	10	12	14	16	18	20
Ayrshire ..	8	8	10	12	14	16	18	20	20
Shorthorn	10	10	12	14	16	18	20	20	20
Br'n Swiss	10	10	12	14	16	18	20	20	20
Holstein ..	10	10	12	14	16	18	20	20	20

TABLE 3.—*Change from whole to skim milk*

	1st day Monday		2d day Tuesday		3d day Wednesday		4th day Thursday		5th day Friday		6th day Saturday		7th day Sunday	
	Whole milk	Skim milk	Whole milk	Skim milk	Whole milk	Skim milk	Whole milk	Skim milk	Whole milk	Skim milk	Whole milk	Skim milk	Whole milk	Skim milk
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
A. M.....	7	0	6	1	5	2	4	3	3	4	2	5	1	6
P. M.....	6	1	5	2	4	3	3	4	2	5	1	6	0	7

fore needs especial care until it is well started, much trouble may be prevented.

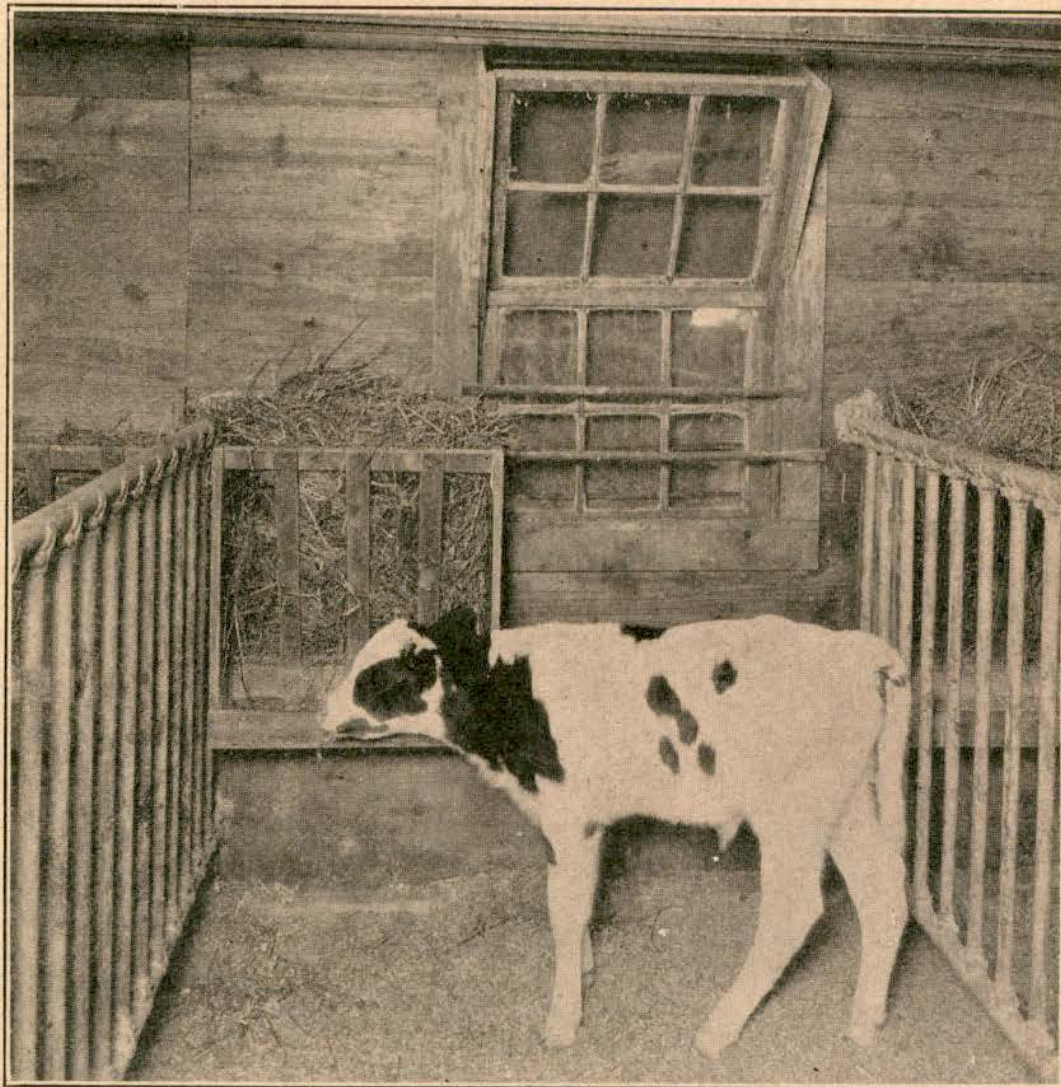


FIG. 5.—Calf pen, showing tilting window, hayrack, and manger

HAY AND GRAIN

At the beginning of the third week, fine, clean, bright, leafy hay, preferably a legume should be available so that the calf may eat at will. A small rack for hay, attached to the side of the calf pen, with a shallow trough below to catch the fine leaves, is a great convenience. For a time the calf will not eat much hay, but it will become accustomed to chewing it and will gradually eat more and more.

A small shallow box about 8 inches square with rounded corners, fastened to the side of the pen, is a convenient way of feeding grain. During the second or third week a little grain may be rubbed over the calf's nose and mouth after it has finished its milk, so that it will become accustomed to the taste of the grain. It will lick off the grain and will get its first taste of that kind of feed. Never feed grain in the milk but always feed it dry, in boxes or mangers. Good grain mixtures for young calves include the following:

- | | | |
|---|--|---|
| 1. | 2. | 3. |
| Cracked corn | 1 part cracked corn
1 part wheat bran | 2 parts cracked corn
1 part ground oats
1 part wheat bran |
| 4. | 5. | |
| 1 part ground oats
1 part wheat bran | 5 parts cracked corn
2 parts ground oats
2 parts wheat bran
1 part linseed oil meal | |

For a time, the calf will eat but a small quantity of grain daily, so put only a little in the feed box and clean it out often and discard any refused feed. The calf at this age ought to have all the grain and hay it will eat.

WATER AND SALT

At three weeks of age and thereafter, a calf should have access to clean water. Sometimes it is convenient to water

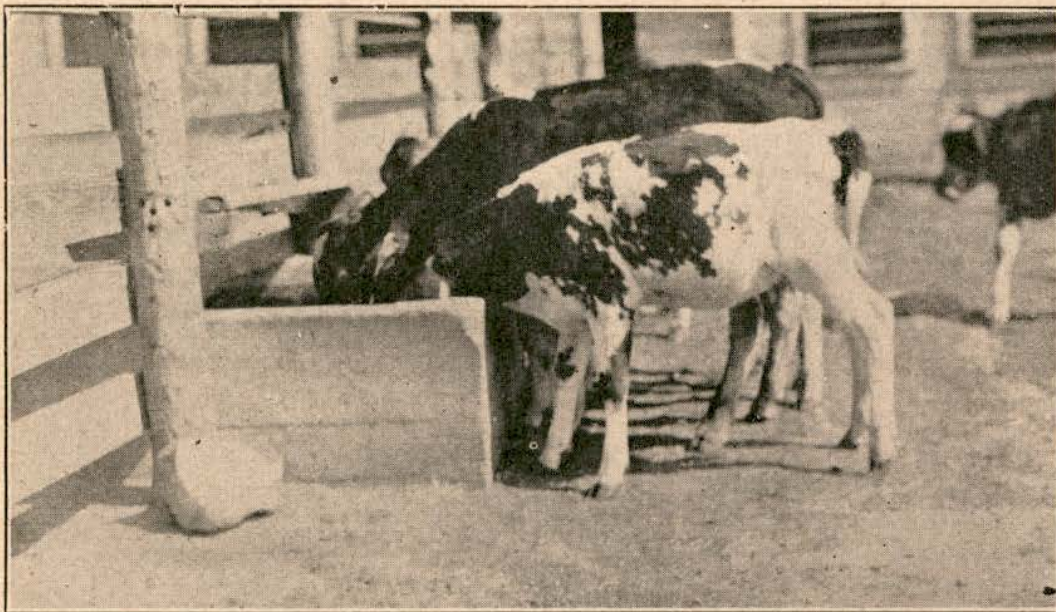


FIG. 6.—Water and salt are necessary

calves in the milk pails, in which case it should be done after they have finished drinking milk. Watered at that time they will not drink too much. In cold weather the water should be warmed, since cold water may chill the calf's stomach, causing digestive troubles.

After the third week a salt brick should be available, and many feeders also add 1 per cent of salt to the grain mixture. Either method will be satisfactory.

PASTURE

Early pasture is never good for young calves. In fact, it is seldom advisable to turn a calf under four weeks old on pasture at all. A young calf is likely to eat so much of the green grass that it will develop scours. Later on, after it gets well accustomed to eating hay and grain, it is less likely to scour when turned on pasture. It is a good plan to turn on pasture only those calves that have gained regularly in weight and then only after they are a month old. Any pasture used for calves should have shade, so that they need not lie in the hot sun.

CARE OF CALF FIFTH TO EIGHTH WEEK

QUANTITY OF MILK

After the fourth week, the quantity of skim milk may be increased gradually as indicated in the previous chart until 20 pounds daily is reached. It is not believed that it pays to feed more than that quantity daily unless skim milk is very plentiful.

OTHER FEED

The calf gradually increases its consumption of grain until by the fifth week it is eating about one-half pound daily and by the time it is 8 weeks old it will be consuming about 1 pound daily. Hay consumption is also increased until the calf satisfies its appetite.

MANAGEMENT

It is important during this period that calves have plenty of exercise, and provision should be made so that this is possible each suitable day. A lot adjacent to the calf pen is a great convenience, especially so if it is possible for the calves to run back and forth into the pen.

CARE OF CALF NINTH WEEK TO SIX MONTHS

MILK

If it is plentiful, skim milk may be fed until the calf is 6 months of age or even longer. Usually it is satisfactory to discontinue skim milk about the fourth or fifth month, depending upon the season of year, the availability of skim milk, and the growth of the calf.

FEED

The quantity of hay consumed gradually increases as the animal gets older and heavier. Legume hay should be used if it is available, and if not, some other fine leafy hay of good quality.

After the calf is 3 months old it may receive silage, and will often eat 3 or 4 pounds daily at that time. The quantity fed should never exceed 10 pounds daily up to the time the calf is 6 months old. When starting silage, feed only a little until the animals get accustomed to it and be careful to always feed it fresh.

There need be no change in the kind of grain fed, but the quantity should be gradually increased with the growth of the calf. The quantity fed need never exceed 3 or 4 pounds daily up to the time the calf is six months old.

MANAGEMENT

During the summer, calves of this age should be turned on a shady pasture where they may lie in comfort during hot days. Water should also be available at all times and a salt brick should be placed in a convenient spot. It is a great convenience if at this age calves are taught to lead with a halter. It takes little time but saves much difficulty later on.

CARE OF CALF SIX MONTHS TO ONE YEAR

FEED

The object of the feeder is to obtain good skeletal growth so that the heifer will be of good size and well-developed before she enters the milking herd. During this period, the calves may receive grain at the rate of one-fourth to one-half pound daily for each 100 pounds of live weight. The grain mixture may be the same as that used for younger calves, or it may be the ordinary grain mixture fed to the herd. Common mixtures that contain home grown feeds are: 2 parts cracked corn, 1 part ground oats, or 1 part cracked corn, 1

part ground oats, and 1 part wheat bran. Cracked corn alone is quite satisfactory if legume hay is fed.

The roughage should always be fine and of good quality and legume hays are much to be preferred because of their palatability and their protein and lime content. Protein and lime are necessary in the proper development of muscle and bone in young animals.

Heifers and young bulls should always have all the hay that they will clean up, which will usually amount to from 1 to 2 pounds daily for each 100 pounds of live weight. Silage, during this period, may be fed at the rate of 1 to 1½ pounds daily for each 100 pounds of live weight. Do not feed too heavily of silage, as too much silage is not good for young animals. The principle to be followed in feeding is to keep the animals growing normally without becoming over-fat.

PASTURE

When good pasture is available, other feeds are unnecessary. Frequently, however, pasture is short and dry after the middle of the summer and if additional feed is not supplied, the animals lose weight, and growth stops to a great extent.

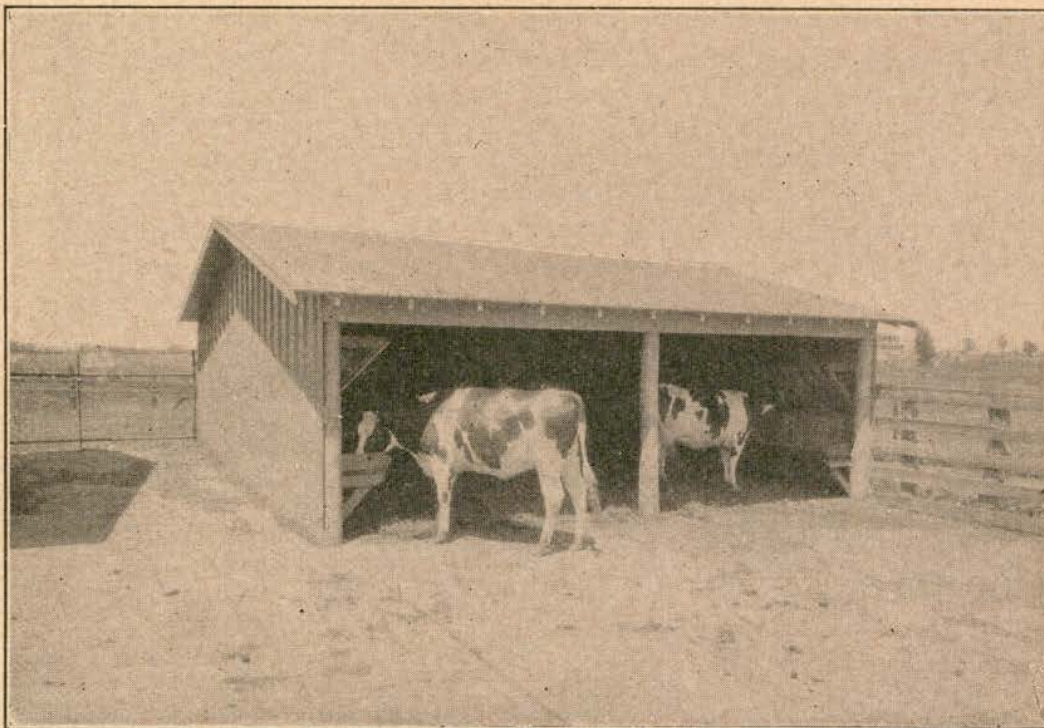


FIG. 7.— Open shed for young stock

SHELTER

In moderate climates, an open shed should be provided for housing young stock after they are 6 months of age. Open sheds in very severe climates should have doors that can be closed in the most extreme weather. With plenty of feed and plenty of bedding and protection against wind, snow, and rain, young dairy stock will be healthier and will make more satisfactory growth if housed in an open shed thruout the year. A satisfactory open shed should open to the south or opposite the direction of the cold winter storms, should have not less than 60 square feet of floor space per animal, and should be not less than 20 feet deep. Racks for hay and mangers for grain should be provided under the shed. There should always be a lot adjoining that will allow plenty of room for exercise.

Calves should never be shifted from the calf pen to an open shed in very cold weather. It is good practice not to change any animals during the winter months.

CARE OF HEIFER — ONE YEAR TO TWO YEARS

FEED

The quantity of grain may be regulated according to live weight, from one-fourth to three-fourths pound daily to each 100 pounds live weight, depending upon the other feeds available and upon the growth of the animal. The grain mixture used need not differ from that used with younger heifers. The hay consumed will vary from 1½ to 2 pounds for each 100 pounds of live weight. Silage may be fed at the rate of 1½ to 2½ pounds per 100 pounds of live weight. During this period it is especially important that heifers be well-fed.

MANAGEMENT

The heifers during this period are kept under the open shed and should have plenty of exercise and should have access to salt and water at all times. Pasture forms an important part of their feed and should be utilized to the fullest extent. In the summer months, pasture needs supplementing with other feeds only when the animals fail to make satisfactory growth.

AGE TO BREED

The age to breed heifers depends upon their growth and development, and the season of the year. In general, it is good practice to breed between January 1 and April 1 in

order to insure fall calving. Jerseys, Guernseys, and Ayrshires are customarily bred after they are 15 months of age, while Shorthorns and Holsteins are bred after they are 17 months of age. Brown Swiss are bred at any time after 18 months of age. The exact age to breed under any particular conditions will have to be determined by the person familiar with all conditions. Usually it is not desirable, if animals of normal size are to be developed, to breed heifers to freshen before they are two years of age. This would mean that 15 months is the earliest possible breeding date.

PREPARATION FOR ENTERING THE MILKING HERD

A month or so before freshening, the heifer should be placed in the barn with milking cows so that she will become accustomed to the surroundings. She should be petted occasionally, her udder should be handled, and in every way possible she should be taught the routine that she is to follow upon entering the milking herd. A little extra trouble at this time will save much trouble later on. Following out this plan, it will not be necessary to "break" a cow to milk.

CARE OF THE YOUNG BULL

The young bulls should be separated from the heifers after the bulls are 3 months of age to avoid their annoying the heifers. From that time on, the feed and shelter recommended for the bulls is identical with that recommended for the heifers except that it is advisable to feed the bulls somewhat more grain. The extra grain is essential if the bull is to be grown out well and developed into a large vigorous animal.

The young bull, if well-grown, may be used for light service when 10 months of age, but great care should be used that only a few cows are bred to him before he is 2 years old. Probably he should not serve more than 1 cow every 3 weeks up to the time he is a year and a half old.

A brass or cannon metal bull ring should be inserted in the nose of the young bull when he is about 6 months old. This will provide a means of control later on.

When but a few months old, every young bull should be taught to lead with a halter. If this is not done, it may be difficult to handle him when he has reached maturity.

An open shed with a good-sized exercise lot is very useful for housing young bulls. When dehorned, a number of bulls kept together will exercise themselves.

MILK SUBSTITUTES

When skim milk is not readily available or is too costly, efforts are usually made to reduce the quantity fed to the minimum. Fresh, sweet whey from a cheese factory, after it is pasteurized, is a fairly good substitute for skim milk. If at all possible it should be warmed to at least 90° F. before being fed. If this is impossible, feed it at the same temperature each day. Whey may be used for skim milk at the same time and in the same manner. Usually it will not give as good results and the calves are more likely to suffer digestive disturbances.

Pasteurized buttermilk that is the by-product from churning very sour gathered-cream does not make a good feed for young calves altho it sometimes is used with fair results. Powdered buttermilk and semisolid buttermilk are not very satisfactory for feeding young dairy calves.

Sour skim milk can be used, but is not to be advised.

Skim milk powder dissolved in water is probably the best substitute for skim milk. One pound of powder dissolved in 9 pounds of hot water (110°-140° F.) and allowed to cool to 95° F. may be used in place of skim milk with good results.

Gruels, made of various materials, are in quite common use where the whole milk is sold and little skim milk is available for calf feeding. The most satisfactory of these contain skim milk powder. Commercial preparations are on the market which give good results but usually are expensive. Some calf meals that have been used with success are:

HAYWARD'S CALF MEAL

30 lbs. wheat flour
25 lbs. cocoanut meal
20 lbs. powdered skim milk
10 lbs. linseed oil meal
2 lbs. dried blood

One-half pound of the mixture is stirred into three pints of boiling water and when sufficiently cool constitutes one-half of a daily feed for a calf a month old. As the calf gets older the quantity fed is increased so that at the maximum it is getting 1½ pounds of the meal daily.

PURDUE CALF MEAL *

10 lbs. hominy feed
10 lbs. linseed oil meal
10 lbs. red dog flour
10 lbs. dried blood

One-half pound of the mixture is stirred into three pints of boiling water and allowed to cool to 95° F. This constitutes one feed when the calf is fed twice daily at one month of age. The maximum quantity fed need never exceed 1½ pounds of the calf meal daily.

* Purdue University, Agricultural Experiment Station, Bul. 193, 1916.

SELF-FEEDERS

Self-feeders, from which young calves may eat grain at will, have proved to be very useful under certain conditions. The self-feeder saves labor, and calves make good gains provided they get accustomed to the grain gradually. Calves may easily eat too much and develop indigestion. Unless kept in individual pens, they usually suck each other more under this system than under other systems of feeding. Whole corn works well in a self-feeder, altho a grain mixture such as suggested previously will give good results.

MARKING FOR IDENTIFICATION

Marking for identification is important in all herds, particularly if the breed of cattle are solid color or have markings that are very similar. It should always be possible to identify the animal correctly.

Ear tags, the most common method used, are very satisfactory. The tag, usually made of aluminum or composition, may be inserted in the ear either as a button or as a metal loop, or as a circular disk suspended from a ring. The tag usually has the name of the owner and a herd number upon it. Tags placed in the upper part of the ear are not so easily torn out. Disk tags suspended from the upper edge of the ear by means of a fish-hook hog ring are simple, easily inserted, inexpensive, do not tear the ear, and are easy to read.

Tattooing is very satisfactory with animals having light-colored skin in the ears, but is less useful with those having dark-skinned ears. A tattooing outfit has full directions for use attached.

Notching or punching holes in the ears, while it tends to disfigure the animal, is in other ways satisfactory. Usually some system is followed such as the following:

Notch on upper edge of left ear.....	1
Notch on lower edge of left ear.....	3
Notch on upper edge of right ear.....	10
Notch on lower edge of right ear.....	30
Hole in left ear.....	100
Hole in right ear.....	200

If this system is to be followed, a punch is indispensable. Notching the ear with a knife is usually not satisfactory, as such cuts, if not deep, grow together readily, and if deep, disfigure the animal badly.

TABLE 4.—Gestation Table

Calculated at the average period of 282 days, for every day in the year. The period may actually be several days shorter or longer.

Jan.	Due	Feb.	Due	Mch.	Due	April	Due	May	Due	June	Due	July	Due	Aug.	Due	Sept.	Due	Oct.	Due	Nov.	Due	Dec.	Due
Serv.	Oct.	Serv.	Nov.	Serv.	Dec.	Serv.	Jan.	Serv.	Feb.	Serv.	Mch.	Serv.	April	Serv.	May	Serv.	June	Serv.	July	Serv.	Aug.	Serv.	Sept.
1	10	1	10	1	8	1	8	1	7	1	10	1	9	1	10	1	10	1	10	1	10	1	9
2	11	2	11	2	9	2	9	2	8	2	11	2	10	2	11	2	11	2	11	2	11	2	10
3	12	3	12	3	10	3	10	3	9	3	12	3	11	3	12	3	12	3	12	3	12	3	11
4	13	4	13	4	11	4	11	4	10	4	13	4	12	4	13	4	13	4	13	4	13	4	12
5	14	5	14	5	12	5	12	5	11	5	14	5	13	5	14	5	14	5	14	5	14	5	13
6	15	6	15	6	13	6	13	6	12	6	15	6	14	6	15	6	15	6	15	6	15	6	14
7	16	7	16	7	14	7	14	7	13	7	16	7	15	7	16	7	16	7	16	7	16	7	15
8	17	8	17	8	15	8	15	8	14	8	17	8	16	8	17	8	17	8	17	8	17	8	16
9	18	9	18	9	16	9	16	9	15	9	18	9	17	9	18	9	18	9	18	9	18	9	17
10	19	10	19	10	17	10	17	10	16	10	19	10	18	10	19	10	19	10	19	10	19	10	18
11	20	11	20	11	18	11	18	11	17	11	20	11	19	11	20	11	20	11	20	11	20	11	19
12	21	12	21	12	19	12	19	12	18	12	21	12	20	12	21	12	21	12	21	12	21	12	20
13	22	13	22	13	20	13	20	13	19	13	22	13	21	13	22	13	22	13	22	13	22	13	21
14	23	14	23	14	21	14	21	14	20	14	23	14	22	14	23	14	23	14	23	14	23	14	22
15	24	15	24	15	22	15	22	15	21	15	24	15	23	15	24	15	24	15	24	15	24	15	23
16	25	16	25	16	23	16	23	16	22	16	25	16	24	16	25	16	25	16	25	16	25	16	24
17	26	17	26	17	24	17	24	17	23	17	26	17	25	17	26	17	26	17	26	17	26	17	25
18	27	18	27	18	25	18	25	18	24	18	27	18	26	18	27	18	27	18	27	18	27	18	26
19	28	19	28	19	26	19	26	19	25	19	28	19	27	19	28	19	28	19	28	19	28	19	27
20	29	20	29	20	27	20	27	20	26	20	29	20	28	20	29	20	29	20	29	20	29	20	28
21	30	21	30	21	28	21	28	21	27	21	30	21	29	21	30	21	30	21	30	21	30	21	29
22	31	22	30	22	29	22	29	22	28	22	31	22	30	22	31	22	31	22	31	22	31	22	30
23	Nov.	22	1	23	30	23	30	Mch.	1	23	April	1	23	May	1	23	June	22	July	1	23	Aug.	23
24	1	23	2	24	31	24	31	23	2	24	2	23	2	24	2	23	1	23	2	23	1	23	1
25	2	24	3	Jan.	1	25	1	24	3	25	3	24	3	25	3	24	2	24	3	24	2	24	2
26	3	25	4	25	2	26	2	25	4	26	4	25	4	26	4	25	3	25	4	25	3	25	3
27	4	26	5	26	3	27	3	26	5	27	5	26	6	27	5	26	4	26	5	26	4	26	4
28	5	27	6	27	4	28	4	27	6	28	6	27	7	28	6	27	5	27	6	27	5	27	5
29	6	28	7	28	5	29	5	28	7	29	7	28	8	29	7	28	6	28	7	28	6	28	6
30	7	29	8	29	6	30	6	29	8	30	8	29	9	30	8	29	7	29	8	29	7	29	7
31	8	30	9	30	7	31	7	30	9	31	9	30	10	31	9	30	8	30	9	30	8	30	8
31	9	31	10	31	8			31	10			31	11			31	9	31	10			31	9

KEEP BULL SEPARATE FROM HERD

It is always advisable to keep the bull separate from the herd, in which case it is easily possible to record the date of breeding. From this date, by means of a gestation table, the probable date of calving may be determined.

GAIN IN WEIGHT OF DAIRY CALVES

The easiest method of determining whether a calf or heifer is making satisfactory growth is by the average daily gain in pounds of live weight. While weekly and monthly weights are best, weights taken every three months or every six months are very useful in determining the rate of growth.

TABLE 5.—*Daily gains of dairy calves*

	Birth weight	Gain per day Birth to 3 mos.	Gain per day Birth to 6 mos.	Gain per day Birth to 9 mos.	Gain per day Birth to 1 year
	Pounds	Pounds	Pounds	Pounds	Pounds
Jersey	40- 60	.7-1.0	1.0-1.3	1.2-1.5	1.2-1.6
Guernsey	50- 70	.8-1.0	1.0-1.4	1.2-1.6	1.2-1.6
Ayrshire	50- 70	.9-1.2	1.2-1.6	1.3-1.7	1.3-1.7
Holstein	80-100	1.3-1.5	1.5-2.0	1.5-2.0	1.6-2.2

The above table will give some idea of daily gains that may be expected for dairy heifers, well cared for, between different ages. Put in another way, a normally-grown heifer of each of the breeds would weigh according to the table * below:

TABLE 6.—*Average calf weights by ages*

	Average weight birth	Average weight 3 months	Average weight 6 months	Average weight 9 months	Average weight 1 year
	Pounds	Pounds	Pounds	Pounds	Pounds
Jersey	50	130	265	380	500
Guernsey	65	150	320	460	550
Ayrshire	65	150	330	475	560
Holstein	90	220	400	575	735

* Experiments at the University of Nebraska.

GENERAL CONSIDERATIONS

FALL VS. SPRING CALVES

General dairy practice makes fall calving more desirable than spring calving. Calves dropped in the fall are usually ready to go on pasture in the spring about the time that they are weaned from milk. The green grass is appetizing and there is usually no failure to gain in weight. Spring calves are on pasture while they are still receiving milk, and are weaned about the time that they must be placed upon dry feed. Frequently, under such conditions, calves fail to gain in weight for a month or more. In the winter there is usually more time to care for calves than in the summer with its press of outdoor work. Heifer calves dropped in the fall freshen at 24 to 27 months of age, which will be in the fall or winter, and will fit well into the general herd practice.

TWINS

Twins of the same sex are ordinarily normal in every way. In the case of twins of the opposite sex, the female is frequently sterile (fails to breed). Roughly speaking, about 1 heifer out of 6 will breed. Twins are usually smaller than the average calves of the breed at birth but usually develop into normal animals.

EXTRA TEATS

Frequently heifers have 5 or more teats. The extra teats are likely to cause unbalanced and misshapen udders later on and should be removed by a veterinarian before the animal is 3 months old. Care must be taken to see that the right ones are allowed to remain.

CALF STANCHIONS

Metal calf stanchions that are a part of the railing of the calf pen may be purchased from manufacturers. Home-made stanchions may be constructed of cheap or scrap lumber. The stanchion should be forty inches high, with a four-inch opening for the calf's neck. Stanchions are a great convenience in feeding milk.

VENTILATION

Perhaps nothing is more important for calf health in the winter time than proper ventilation in the calf pen. Any system that will insure the removal of the damp air promptly

and prevent drafts is satisfactory. One system consists in having the top sash tip in at the top, against metal or wood side pieces, which force the air in over the top of the windows. By means of pegs, stops, or a chain, the window may be opened to varying distances. Such a system gives good results provided the windows are adjusted to meet the weather conditions. Damp, foul air is an indication of poor ventilation and if this condition is allowed to continue it will likely cause pneumonia.

CALF AILMENTS

SCOURS FROM INDIGESTION

Scours or diarrhea is one of the most common ailments of calves. It usually hinders growth and reduces or stops the daily gain in weight. Scours may be caused by irregular time of feeding, unequal quantities of milk, overfeeding, cold milk, dirty or sour milk, milk from diseased cows, sudden change of feed, fermented feeds, dirty feeding utensils (pails, feed boxes, etc.), or damp, dirty stables. As soon as the diarrhea is observed, reduce the quantity of milk one-half and carefully clean the pails, feed boxes, and stalls. Carry on the calf feeding in a regular manner, being especially careful about the temperature of the milk. In severe cases, the milk may be reduced to one-fourth.

For treatment of scours, the calf may be given 2 drops of formalin for each pound of milk fed. This acts as an intestinal antiseptic and often effects a cure. A better method is to give the calf 3 tablespoons of castor oil (as a drench) followed 24 hours later by a teaspoon of a mixture of 1 part salol and 2 parts subnitrate of bismuth. Home remedies, sometimes effective, are: 2 raw eggs; a teaspoon of blood meal at a feed; or a half-cup of lime water at a feed.

WHITE SCOURS

Infectious dysentery or white scours appears shortly after birth and is noted by light colored, very offensive droppings. The calf is quickly weakened and usually dies within 3 days. Consult your local veterinarian about serum. As this disease is contagious, sanitary precautions, such as painting the navel and complete disinfection, will prevent a recurrence of the disease.

PNEUMONIA

Pneumonia in calves is very common, especially in late fall, winter, and early spring. The symptoms are coughing, rapid and difficult breathing, increase in temperature, rapid pulse, listlessness, and running at the nose. Pneumonia is very hard on calves and the greatest care is needed to assist them to recover. Constant temperature, fairly warm quarters free from drafts, dry stalls, and care in feeding will help greatly. Feed from one-half to three-fourths of the regular amount of feed. A raw egg at a feed is sometimes useful. In cold weather, blanketing is useful. Good results have been obtained by the use of hypodermic injections, in the neck, of 8 to 10 cubic centimeters of a mixture of 800 cubic centimeters of olive oil, 200 grams of gum camphor, and 1½ ounces of beechwood creosote, at intervals of once a day or even twice a day in severe cases.

BLOAT

Indigestion may sometimes cause bloat in calves. When bloat does occur, a stick tied in the mouth may relieve the condition, if not too serious. A drench of 4 cubic centimeters of formaldehyde in a quart of water is helpful in relieving the condition. Only in very severe cases should the animal's stomach be punctured. If this is necessary, use a trocar and canula, if available. A clean, sharp knife will do in an emergency. In either case, the incision should be made on the left side in the middle of the triangle formed by the hook bone and the last rib, the insertion being downward and forward.

RINGWORM

Ringworm is caused by a parasite which affects the hair and the top layer of skin causing bare circular spots in the hide that are covered with crusts. Treatment consists in washing with soap and water and then applying tincture of iodine once a day until the condition improves.

LICE

Sanitary precautions are helpful in preventing lice. A common and quite satisfactory method of getting rid of them is to apply a solution of 1 ounce of sodium fluoride in 1 gallon of water, washing the animal thoroly. The process should be repeated in from ten to fourteen days to kill the nits. In winter, when washing is undesirable, apply the sodium fluo-

ride in powder form, sprinkling it along the neck, back, shoulders, inner surface of the thigh, and on the head and ears. Be very careful not to sprinkle the sodium fluoride in the eyes. Two treatments are always necessary, 10 days to 2 weeks apart.

[5M]