Raising Dairy Calves

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Raising Dairy Calves

BY EARL WEAVER, C.A. MATTHEWS AND BURT ODERKIRK
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Raising Dairy Calves

BY EARL WEAVER, C. A. MATTHEWS AND BURT ODERKIRK

Should Dairymen Raise the Heifers or Buy Cows to Replenish Their Herds?

In the Corn Belt it costs approximately $100 to raise a heifer calf from birth to producing age. About three-fourths of this charge is for feed; the rest is for labor, housing and other items.

The attitude that the raising of heifers is a too expensive practice is held by some dairymen with grade herds who are located in the denser dairy regions where whole milk is the product sold and feed prices are usually high. Farmer-dairymen, who sell cream and have skimmilk available, and breeders of purebreds generally do not question the advisability of raising heifers. Purebred heifers cost but little, if any, more to raise than grades and have about twice their value.

As over 50 percent of the milk produced in the United States comes from herds selling whole milk, a great many calves are involved in the deliberations of the dairymen on the advisability of raising the calves.

About 9 million heifer calves are born in dairy herds each year in the United States. Five to six million of these must be grown out, bred and carried to first freshening in order to maintain the normal number of producing cows in the country.

The continued success of a dairymen depends largely on his ability to make replacements in his herd. One of two choices is to buy animals to take the place of those which have left the herd. If he is a shrewd and capable judge of cows, he can buy replacements with reasonable success. However, good cows are costly and difficult to secure. If there is continued neglect of raising heifer calves in too many herds, good females are destined to be increasingly expensive. It is commonly observed that herds which have relied upon purchases to maintain their numbers are generally no more productive today than they were five or ten years ago. Furthermore, such herds are likely to encounter diseases because of the necessity of securing animals from various sources.

The man who chooses to raise heifer calves from his best cows also has some difficulties. If skimmilk has considerable market value it may cost $150 to raise a heifer to producing age. Then, there are the risks of losing some by death after a considerable investment in raising them, discovering some to
be non-breeders, and having some prove to be inferior in their milking ability. Nevertheless the plan of raising heifers has outstanding advantages and is profitable in the long run. It generally can supply the dairyman with cows at a lower cost per head than would be the case if he purchased them. It is the most desirable safeguard against disease outbreaks. Especially, it affords, thru the use of a good purebred sire, the best procedure yet devised for a man to enlarge and improve his herd.

Calves to Be Raised

Too many dairymen who follow the plan of raising their heifers make the mistake of trying to raise all of them. Obviously a large percentage of the cows of the country are inferior. They should not be allowed to propagate more of their kind, as they would do if bred to bulls no better than themselves.

No dairy calf is worthy of being raised unless it is sired by a well selected purebred bull. Calves sired by inferior bulls are liabilities at birth and the liability increases with every cent expended upon them. While it does not necessarily follow that all grade calves by purebred bulls are creditable, little fear need be felt of the outcome, if a bull be carefully and intelligently selected.

Good Sires Make Calf Raising Profitable

No proof of the value of purebred sires has ever been more forceful than that secured from an experiment reported in Bulletin No. 251 of the Iowa Agricultural Experiment Station. This bulletin shows what improvement may be expected from using a well selected purebred dairy sire on scrub cows. In Table I are shown the yearly records of the scrub cows used in this experiment and the records of their daughters and granddaughters sired by dairy bulls.

The value of purebred sires is further emphasized when the material of Table I is presented as percentage increases.

From Tables I and II, it may be concluded that the use of dairy sires on scrub cows for one generation will increase the productivity of the daughters about 40 percent. The further

<table>
<thead>
<tr>
<th></th>
<th>Milk pounds</th>
<th>Fat pounds</th>
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<th>Fat pounds</th>
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<td>194</td>
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<td>270</td>
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<td><strong>Average</strong></td>
<td><strong>4,110</strong></td>
<td><strong>192</strong></td>
<td><strong>5,815</strong></td>
<td><strong>257</strong></td>
<td><strong>8,056</strong></td>
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</table>
Fig. 1. The desirable herd sire brings profits on a dairy farm. Daughters from such bulls as this give promise of success and justify the cost of raising them.

TABLE II. PERCENTAGE INCREASE IN THE PRODUCTION OF DAUGHTERS AND GRANDDAUGHTERS OVER THE SCRUBS

<table>
<thead>
<tr>
<th></th>
<th>Daughters over Scrubs</th>
<th>Granddaughters over Scrubs</th>
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<tbody>
<tr>
<td></td>
<td>Milk</td>
<td>Fat</td>
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<tr>
<td>Guernsey</td>
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<td>25</td>
</tr>
<tr>
<td>Holstein</td>
<td>83</td>
<td>54</td>
</tr>
<tr>
<td>Jersey</td>
<td>24</td>
<td>39</td>
</tr>
<tr>
<td>Average</td>
<td>41</td>
<td>39</td>
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use of dairy sires on these grades approximately doubled the production of the granddaughters over the scrubs.

Increased production is not the sole aim in dairy farming. It is but an initial step. Increased economy follows greater production and the two attain the end for which cows are kept—enlarged profits.

Healthy Calves at Birth Are Essential

If a calf is healthy and vigorous at birth, the danger of its becoming a weakling is greatly reduced. Infectious abortion is prevalent in many herds and is a most serious threat to all herds. This disease especially affects the cow and generally results in premature, dead calves. Sometimes the premature calf lives, but in such cases it is invariably stunted and can be raised only with extreme care and good fortune. Cows affected with abortion disease do frequently carry calves to maturity, but these calves are not vigorous at birth; they have
Fig. 2. Sanitary and comfortable pens make calf raising safer.

not been properly nourished in their prenatal development and are more subject to disease than calves from healthy cows.

It is generally admitted that the bull will not disseminate infectious abortion thru a herd of cows at services, but regardless of the improbability of danger from this direction it is a good plan to disinfect the bull’s sheath before and after each service. For this purpose a large syringe can be used, one with a hard rubber tube being preferable to one of metal. The metal tube is likely to become rough and may cause an injury. A solution of lysol, carbolic acid, iodine or any other standard disinfectant is satisfactory, care being exercised to have the solution properly diluted. A solution too strong may cause soreness and difficulty in getting the bull to serve. It is a good plan to change from one solution to another from time to time.

In addition to observing this precaution with the bull every care must be exercised to prevent the introduction of infectious abortion into the herd or to eradicate it if it has gained a foothold. The regular application of the agglutination test is the procedure being widely used at present to detect the dangerous cows in the herd. The reacting or aborting cows must be isolated or sold. The non-reacting cows and the young heifers should be kept on clean premises, and rigid sanitary precautions under the direction of a competent veterinarian must be observed.
Tuberculosis is becoming a less serious problem each year because dairymen have employed drastic measures to eradicate it from their herds. The disease is not inherited and except in extreme cases of emaciation and weakness a tubercular cow will drop just as healthy a calf as will a healthy cow. The only necessary precaution is that against allowing the calf to become infected after birth. To guard against this danger the calf must be removed from the cow immediately upon birth. The cow must not be allowed to lick nor suckle the calf, and the calf must not receive milk from any tubercular cow unless this milk be pasteurized.

To make further provision for the health of calves they must be born in sanitary quarters. The maternity pen must be clean, light, well ventilated and comfortable. It is a misfortune for a calf to come in a stall infected with any of the calf diseases. Before the calf is dropped the pen should be thoroughly cleaned, slaked lime should be spread on the floor and dip should be used. Clean straw completes the preparations.

**Fall Calves Are Best**

Under the best dairy practice cows are bred to freshen in the fall of the year. The primary object of fall freshening is to secure the greatest milk flow from the cows during the winter season when milk prices are highest. It has also been found that fall freshening cows will produce from 12 to 15 percent more milk for the year than spring freshening cows.

There is yet another reason why fall freshening is desirable, in that better calves will result. Many breeders greatly prefer the fall calves and it has been found that they grow more rapidly and are larger at first freshening than spring calves. Also fall calves are more cheaply raised. They demand milk and grain for their first six months but then can be turned onto pasture, which is cheap. Spring calves demand milk their first six months, then winter comes and they require expensive winter feeds so that they are more costly at one year of age than fall calves.

**Fit the Cow for Freshening**

It is generally recognized that the size of the dam has an influence upon the size of her calf. The Iowa Station has found that cows weighing 700 pounds produced 55-pound calves, while the calves of 1,500 pound cows weighed 100 pounds at birth. The factor of breed is not excluded from these figures, but as a rule larger calves are more easily and satisfactorily raised. The rule is almost invariable when the larger and smaller calves within a given breed are concerned.
It readily follows that the best calves will be produced by the cows which are rugged and of normal size.

The amount of nutrients required by a fetus is naturally small, yet it is important that enough be furnished the cow during pregnancy to develop properly the unborn calf.

The limiting of a pregnant cow's ration to the point where she is unthrifty and emaciated affects her calf adversely. It is reported by some that extremely fat cows also drop weak calves. This may be true of fat sows and mares but it is doubtful if a dairy cow can ordinarily be so fattened as to impair the vitality of the calf she is carrying.

The pregnant cow should be put into as good, healthy condition as possible and should be allowed to carry a great amount of flesh. It is a commendable plan to dry the cow up from a previous lactation not later than two months before the calf is due. This allows the cow sufficient time to rest, to build up her body and to nourish the developing fetus. It is probably true that just as good a calf would be dropped if she were not rested, but this is due to the cow's natural tendency for maternity to the point where she will forsake her own body stores that the fetus may be taken care of. Failure to give the good cow this much needed rest impairs

![Fig. 3. A two-day-old calf receiving her last meal at the family larder. This calf has received the colostrum and is well started. Skill and care can quickly accustom her to hand feeding. Note the good condition of the cow, she is ready to start a hard year's work.](image-url)
her own development and forces her to start the next lactation on too low a plane of condition. Inferior cows require no attention in this regard; they will dry up without effort from their owner, but good cows demand a rest and the feed the good cow eats in preparation for a lactation is as profitably used as any during her life.

Too many dairymen make the mistake of not resting their cows for a sufficient time, due either to a desire to secure as much milk as possible from the cow or to difficulty in getting her dry. In the first case the additional milk secured will be offset by the reduced flow throughout the ensuing lactation, while difficulty in drying off a cow may be overcome. It must be remembered that the greater the difficulty in drying off a cow, the greater is her need for a sufficient dry period. Such cows invariably produce extremely large quantities of milk for a few weeks following freshening. During the early part of this flush period they are not recovered from the effects of calving and can not receive full feed for three or four weeks. During this time they do not consume enough nutrients to provide for the milk they give and they produce the milk from their own body stores. The rest period should provide sufficient of these body stores so that they will not be depleted too soon and result in a weakened cow for the remainder of the lactation.

Start in Time and Get the Cow Dry

Two or three weeks is generally enough time to dry off a cow giving 30 pounds of milk. A good plan is to take away any silage or succulent feeds she may be getting. If on pasture she should be kept in the barn and the grain feeding should be stopped. Likewise legume hay should be withheld. It is at this time that timothy hay has its greatest value for dairy cattle feeding and it may be supplied partially to satisfy the cow's hunger. If timothy hay is not available, straw, corn stover or any such dry roughages is equally effective.

If the cow is giving 30 pounds or less, she should be milked only once daily. After three or four days the milk flow will generally be so reduced that two consecutive milkings may be omitted. Within another few days she should be down to 10 or 12 pounds, at which time milking can be stopped entirely. The udder must be watched, however, at this time for spoiled quarters may develop. After this last milking the udder may fill too much in two or three days and should be relieved, but unless it appears too full or feels hard, the milk will be re-absorbed. A precaution in this connection is to be careful, but not unduly alarmed. Also the udder should not be handled any more than necessary because handling it, especially at a
regular feeding and milking time, induces further secretion. When the udder is dry and in good condition, feeding can be resumed.

The plan suggested is a drastic one but drastic action is required with many cows. The cow will probably show the effects of her limited feeding and this treatment must be ended just as early as possible so that it may be overcome in good time.

The feeding of the cow in preparation for freshening is important. If she is on pasture the problem is greatly simplified for the pasture is palatable, nutritious and has a desirable laxative effect. Also pasture is generally made up of different grasses so that sufficient variety is provided to furnish the fetus with the materials which it demands.

When the cows are not on pasture, silage or any other succulent feed is nearly indispensable in providing the laxativeness so much needed. The succulent feed should be supplemented with a legume hay if possible. The legume hay contains great amounts of protein and minerals, especially calcium. The protein is demanded for the tissues of the fetus and for rebuilding the tissues of the cow. The need for minerals in building up the bony structure of the fetus is apparent. When cows are forced to live upon timothy hay or any non-legume roughages and are given insufficient minerals in their rations, they may drop dead or weak calves because of the calcium deficiency. Legume hays prevent this difficulty and should be used. An ample supply of minerals for a dry cow also greatly prolongs and increases her subsequent production.

Except in a few cases, when dry cows are in good flesh, grain must be furnished them in liberal amounts. A good grain mixture for the early part of the fitting period is 2 parts cracked corn, 2 parts ground oats, 2 parts bran and 1 part of a high protein concentrate. This mixture is satisfactory for cows either on pasture or on winter feed and it may be varied to suit individual conditions. The amount of grain to feed must be left entirely to the judgment of the feeder. Plenty of grain is desirable but overfeeding must be avoided.

Corn as a feed for a dairy cow is desirable in that it builds up her flesh readily, it is palatable and is available on nearly all farms. It does have what is described as a heating tendency and should be omitted for a week before the calf is due. Oats are desirable for the dry cow. Bran is looked upon with great favor. Its content of protein is high; it is a good source of minerals, especially phosphorous; and its laxative effect aids in keeping the digestive tract in good physical condition. The choice of the high protein concentrate will depend upon which one is being used in the herd mixture. There is a
belief among dairymen that cottonseed meal should be avoided for cows that are about to freshen. It may have a tendency to constipate them and may affect the calves unfavorably.

About a week before the cow is due her grain allowance should be reduced for she is likely to go off feed easily. For a few feeds immediately before freshening, a wet mash consisting of equal parts of bran, oats and linseed meal is very good. If the weather is cold the use of quite hot water for this mash is recommended.

Every effort must be made to keep the cow’s bowels in a loose condition for this condition lessens the danger of retained afterbirth and results in a better start on feed after freshening. The slightest tendency to constipation must be avoided. If the feces are at all dry and firm, a dose of one quart of raw linseed oil or of castor oil, or a pound of epsom salts is a very desirable safeguard.

Exercise for the dry cow is essential. If the cow is on pasture this exercise is provided. If she is in the barn she should be turned out frequently. The plan of removing the cow from the stanchion to a box stall as early as possible has everything to recommend it because of greater comfort and ease.

**Attention at Calving Time**

At birth a calf undergoes the most critical time in its life. The occasion is likewise a critical one for the cow. If the cow has been properly fitted for freshening and if the calf is due so that the danger of an abortion is past there is little need for anxiety. But even with the best preparation difficulties may occur. Careful and prompt attention is very necessary during the ordeal of calving and it should not be neglected. The experienced attendant can generally calculate pretty closely as to when the calf will come. He can note the pronounced loosening of the vulva and the “falling away” on either side of the tail setting which form pretty reliable indications that calving is near. Another quite reliable guide is the filling and distention of the teats. The latter point is ridiculed by some men, yet it is well to make this observation and know that a normal calving will generally come within a few hours after the teats fill.

When the attendant satisfies himself that the calf will come within the next few hours, he can prepare to make frequent observations. The cow must be placed in a box stall and well bedded with clean straw. It is not well for most cows to know that they are being watched; consequently a constant light near the cow at night is desirable so that she may not
be repeatedly disturbed by an approaching lantern nor turned on lights.

At calving the cow is generally not in need of assistance and it is better to avoid the disturbance of even entering her stall. If difficulty appears an examination should be made to determine the manner of presentation. Normally the front hoofs will appear first, immediately followed by the nose. Even before the nose appears it is possible to determine whether the feet are the front or rear feet. Front feet will be turned down normally and rear feet up. This must be determined quickly and if the calf is on its back or is making a buttock presentation it demands immediate attention and a veterinarian should be secured. A frequent abnormal presentation is with the head turned back. When this occurs the calf must be pushed back and adjusted. Any abnormal presentation should be corrected and after it is corrected the cow can usually deliver alone unless she is exhausted. If it becomes necessary to pull the calf sufficient help must be secured and a rope attached. The pull must come with the cow’s labor. If the cow is standing the pull should be outward and downward rather than straight back. If the cow is lying down the pull should be in the corresponding direction. After the head is delivered every precaution must be taken against allowing the calf to be choked.

Immediate Care May Save a Life

When the calf comes it must start breathing as soon as possible. It is well to remove any mucus from the nose and mouth with the finger. Blowing in the calf’s mouth may often displace any phlegm that may be out of reach of the finger. If the calf continues motionless and fails to emit a sound, there are different methods of starting respiration. A common method is to dash cold water on the calf, or slap the chest vigorously. If these fail, alternate compression and relaxation of the chest may bring results. As soon as the calf breathes, its navel should be disinfected to protect it against infections. Immediately upon delivery nearly all cows show a desire to drink. They should receive all the warmed water they care to consume.

Ordinarily a cow will start licking her calf as soon as it is born. This helps to clean and dry the calf. In extremely cold weather the calf can also be rubbed vigorously with a burlap sack and may be covered to avoid chilling. If after an hour the calf has not sucked it may be helped up and assisted in getting the teat and some warm milk.

It is a good practice to allow a calf to remain with its dam for about two days. This allows the calf time to receive the
colostrum milk and secure a good start. It also permits the calf to suck frequently, which is beneficial both to the calf and the cow's udder. If the calf is left with the cow longer than two days both it and the cow are more disturbed when finally separated. Also the longer the calf sucks the more difficult it is to teach it to drink.

The colostrum milk has long been recognized as of value in furnishing a laxative to enable the calf to void the first feces, or meconium, and to keep the bowels in good order. However, the value of colostrum does not lie entirely in its laxative effect but in its property of providing the calf with certain anti-bodies which fortify it against the many infections liable to occur at this delicate age. The colostrum is valuable and should be given whenever possible. If the young calf fails to defecate within an hour or so after birth it should receive an enema or a very mild laxative. This detail is too often overlooked in handling calves.

**Instructing the Calf in the Ways of the World**

The time immediately following the separation of the calf from its dam is a decisive one. The change from sucking to drinking is difficult and even tho necessary in dairy herds it frequently works a hardship upon the calf. A large part of the difficulty lies in teaching the calf to drink; it is eager for milk and will put its nose in the pail but it does not know how to drink. Patience on the part of the feeder is very essential in providing the necessary instruction.

When the calf is to drink for the first time it should be quite hungry, for then it responds more readily to the will of the feeder. All that is generally required is a small amount of milk in a pail set in the manger or held so spilling is avoided. Most calves will learn to drink after a few minutes. Some of them, of course, are not such apt pupils. When they utterly fail to secure any milk thru coaxing, other action is required. This consists of getting astride the calf's neck, using one's legs for stanchions, and backing the calf into a corner so that some stability may be obtained. Then it is well to let the calf suck a finger and while so doing lower the finger into the milk. This allows the calf to secure some milk and after a few seconds the finger can be withdrawn and the calf will continue to drink. Generally one such lesson suffices, but if it fails the procedure must be repeated until the lesson is learned. Force is the first inclination on the part of the feeder of an obstinate calf, but force really avails nothing; success comes with patience and practice.
Whole Milk Period

In dairy herds it is impractical for cows to suckle their calves until weaning time. The milk from each cow is valuable and it is too abundant for one calf. At best the raising of calves by hand is difficult and many times unsuccessful. While dairymen can meet the obstacles by hand feeding, some of them use nurse cows exclusively. The time will probably come when nurse cows will be more widely used and there is every reason that they can be successful, but care will be required to select suitable cows and to allot each cow a sufficient number of calves so that none will overeat.

Too Much Milk Ruins a Lot of Calves

To raise the calves successfully by hand some precautions are necessary. When the calf is taken from its dam at two days of age the amount of milk it first receives is very important. This amount should be limited and determined largely by the size of the calf. The tendency on the part of most feeders is to furnish too much milk in an effort to avoid hunger and to grow the calf out properly. Under natural conditions the calf takes its milk frequently and in small quantities. Too much milk over-exerts the digestive tract and invariably results in scours. A safe rule is to feed one pound of milk for each ten pounds of live-weight.

Table IV gives the birth weights of calves that have been dropped at the College Dairy Farm.

Five pounds of milk a day for the first two days is a good allowance for normal sized Jersey calves or other calves weighing about 50 pounds. It is even better in many cases to feed less than this amount. The larger Holstein calves may receive eight pounds and the calves between these extremes should be fed accordingly.

During this time the calves should be fed three times daily if possible. More frequent feedings are sometimes given but their increased advantage hardly offsets the greater labor required. The feeding three times a day should continue for three weeks, at which time two feeds a day should be sufficient.

After the calf has been hand fed for two days, the feeder may calculate how rapidly to increase the amount of milk given. The increases should be made gradually and should be

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<td>Holstein</td>
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<td>81</td>
</tr>
<tr>
<td>Jersey</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>All breeds</td>
<td>70</td>
<td>68</td>
</tr>
</tbody>
</table>
designed so that the amount fed at first will be doubled in about four or five weeks. This will mean an increase of a quarter of a pound a day or, as is generally true in practice, a half pound every second day. Such details as one-fourth pound increases may appear superfluous to indifferent calf feeders, but they are really important. To apportion milk properly for young calves, guessing is not satisfactory and scales or a quart measure must be employed. Also the calves must be fed individually in pails; otherwise more greedy and faster calves will rob the others.

There are many points other than the amount of milk which must be observed in successful calf feeding. The milk should have a temperature of about 90° when fed. This is the temperature of fresh drawn milk and if the calves are fed immediately upon milking no heating is necessary except in quite cold weather. If the calf feeding is delayed too long after milking, the milk should be heated either with live steam or a proper amount of hot water. The hot water entails difficulty unless its amount be carefully and regularly determined so that a variation in the fat percentage of the milk can be avoided.

Variation in the temperature of the milk at different feeds is even more serious than allowing the milk regularly to be colder than 90°.

Another essential is that sour milk be avoided for it will induce scours more quickly than any other condition, especially with younger calves. For older calves sour milk may be used if it is not alternated with sweet milk but even then it is not so satisfactory as sweet milk.

The pails used for the calves should be washed and scalded after each feeding rather than allowed to remain in the manger or pen without attention. Regularity in time of feeding is also important for irregularity results in scours just as do uncleanliness and variation in the amount, temperature or acidity of the milk.

After three weeks of whole milk feeding the calves will be taking from 10 to 12 pounds, depending upon their size. Sixteen pounds is sufficient for the largest calves and they seldom need more than this amount. At this time twice a day feeding may be started. It is sometimes recommended that the change to twice a day feeding can be made while changing from whole to skimmilk. Experience teaches, however, that twice a day feeding had better be started a few days before the skimmilk is started so that the two changes may not become effective at the same time.
Skimmilk Period

Whole milk is expensive for calves and it may cost up to 30 or 40 cents a day for each calf. For this reason whole milk feeding must be terminated as soon as possible. The safe time for changing from whole milk varies with the vigor of the calves and the care and success with which they have been attended.

Calves which receive whole milk for a long time are generally fatter and smoother than skimmilk calves but many trials prove conclusively that they do not make superior cows. When calves are exceedingly well attended and fed for several months, the feeding they receive following weaning is often such a change for them that they suffer a setback and are inferior to the cows which received skimmilk in moderate amounts while young. Changing from whole to skimmilk must proceed gradually and should require about 10 days. It is well to displace one pound of whole milk each successive day with one pound of skimmilk.

Calves may profitably be fed on 14 or 15 pounds of skimmilk daily until they are seven or eight months old if the milk is available. It has been found that limiting the amount to 10 pounds of skimmilk daily can give satisfactory gain. Calves will not suffer seriously if weaned at four months and some trials have shown satisfactory results when weaned entirely at six weeks of age. A plan developed at the New Jersey Station involves whole milk feeding for only 30 days. Thereafter no milk is used but the calves are fed a dry mixture. The mixture consists of 100 pounds yellow corn meal, 150 pounds of ground oats, 50 pounds of wheat bran, 50 pounds of linseed meal, 50 pounds of soluble blood flour and 4 pounds each of steamed bone meal, finely pulverized limestone and salt. It can hardly be expected that calves raised on these limited quantities of milk will do so satisfactorily as when larger quantities are available.

Five and six months old calves will readily consume up to 30 pounds of skimmilk daily. These large quantities give a condition not to be obtained in any other way but the practice is not recommended. First of all, it is a sort of pampering, which does not have a beneficial effect later, and it is generally extravagance in that such quantities are not utilized efficiently by the calves. Also excessive milk feeding gives a harsh, thick hide that is objectionable, especially if the calf is to be shown at a fair. If skimmilk in large quantities is available it can be more profitably fed to a sufficient number of hogs.

In feeding freshly separated milk it is a good plan to remove
Fig. 4. Vigorous, thrifty, hand-fed calves that have just passed the weaning stage. They can now get some benefit from pasture but while they are still receiving milk pasture would have done more harm than good.

the foam from the milk. This foam, if eaten by the calf, causes bloating and has been known to enter the nostrils and the lungs, thus causing death.

Buttermilk and Whey

If skimmilk is not available, buttermilk or whey may be used with fairly satisfactory results. At the Kansas Station buttermilk gave less returns than did skimmilk for calves. The buttermilk is generally secured from creameries and this fact entails a risk that must be avoided. Creamery buttermilk often contains excessive amounts of wash water; it is often stored in filthy tanks at the creamery, and is liable to be infected with tubercular bacilli or other pathogenic organisms unless properly pasteurized.

Whey is not to be strongly recommended for calves, but it can be used with reasonable success. Whey lacks the protein found in buttermilk or skimmilk and when used must be supplemented with a large amount of protein in the grain allowed. The Wisconsin Station fed calves whey with good success when the concentrates furnished consisted of 3 parts ground corn, 3 parts standard middlings and 4 parts linseed meal along with a legume hay.

Caution must also be exercised that the whey comes from a source that is free from filth and contagion.
Dried Milk Products

Dried milk products have not been extensively used in calf feeding. These products have given satisfactory results, however, where they have been tried. Skimmilk and buttermilk powder, condensed buttermilk or semi-solid buttermilk and low grade malted milk have been used with success. Restoring these products into the liquid form thru the addition of the proper quantity of water gives a product that can scarcely be distinguished from the fresh materials. Undoubtedly these substances have an adaptability for the calves in the herd from which whole milk is sold. They are entirely safe as a result of sterilization and drying and their only limitation is in the price which must be paid for them. Also the dried products have been added to other concentrates to enhance the ration for older calves that are not receiving milk.

Milk Substitutes—Calf Meals

A milk substitute is a substance designed to replace milk entirely. No calf meal has yet been devised which can with entire satisfaction replace all of the milk from the time the calf is born. The dairyman is almost sure to encounter some difficulties if he tries to omit milk in feeding calves that are less than six or eight weeks old. The use of the calf meal requires more labor and greater precautions than does the use of skimmilk. Also when the calf meal is used there is likely to be more scouring and the calves may not be so thrifty and vigorous. This is because a meal is not entirely suited to the digestive system of a young calf. A great many experiments have been conducted to study the values of different ingredients in calf meals and to determine the amounts of those ingredients that should be used.

A recently suggested calf meal, from the use of which good results have been reported, is one from Cornell University. It is as follows:

250 pounds yellow corn meal
250 pounds red dog flour
150 pounds ground oat groats
150 pounds linseed meal
100 pounds ground malted barley
100 pounds soluble blood flour
10 pounds calcium carbonate
10 pounds precipitated bone meal
10 pounds salt.

To form the gruel, the above meal is mixed with water at about 100° F., in the proportion of 1 to 5 by weight. Then the change is gradually made from milk to the gruel taking two to three weeks for the change.

The Indiana Station has suggested a calf meal consisting of
equal parts of hominy meal, linseed meal, red dog flour and blood meal. It is recommended that one pound of this mixture be added to eight pounds of water and this amount fed daily in the case of a calf six weeks old. Only fairly satisfactory results have been obtained with this meal. Its chief asset lies in the fact that it is the simplest meal that has been suggested by any of the stations. However, even tho it was devised to meet the need of dairymen who wished to mix their own calf meals, there would be considerable cost and difficulty in purchasing some of the ingredients in such small quantities as is required in calf meals. The more complex formulas, while they are generally superior to the simpler ones, cause added difficulty in purchasing the ingredients.

Good calf meals that can be purchased have generally been found more feasible than home mixed ones in serving the purposes of dairymen who find it necessary to use calf meals.

**Other Feeds for Calves**

**Grain.** It is desirable to induce the calves to eat grain at as early an age as possible. When only a few days old a small amount of grain can be furnished. If this grain be given immediately following the milk the calves will generally start using it. Feeding grain after the milk helps also to keep the calves from sucking each other. It makes little difference which grains are used at this time. Corn or oats alone, either whole or ground, or a regular calf mixture is satisfactory. Calves relish whole corn and oats more than the ground grains. Bran and linseed meal are also desirable.

By gradually teaching the young calf to eat grains it will be consuming about one quarter pound per day at three or four weeks of age when the skimmilk feeding is started. At this time a grain mixture is most practical. A good grain mixture is three parts corn, three parts oats, three parts bran and one part linseed meal. Modifying this mixture to a great extent can give just as satisfactory results. Even tho the calves prefer the whole grains it is difficult to get a uniform mixture with them and grinding is generally practical. Corn is of advantage in that it is palatable and its high fat content partly compensates for the butterfat removed in separation. The bran is desirable for its phosphorous content, involved in building the skeletal tissue, its palatability and its laxative effect. The linseed meal contains abundant protein and it is also laxative.

**Hay.** Calves will start eating hay in appreciable quantity when two weeks old. From this time on their consumption of hay increases. Hay should be provided all the time. The importance of hay in the ration for calves has been shown at
the Iowa Station. Two calves were fed milk and alfalfa hay as the only feeds for six months. These calves were normal and healthy throughout the period, while other calves fed milk alone or milk and grain developed many abnormalities of skeleton and were nearly dead in seven or eight months. Then alfalfa hay was furnished these calves and they showed rapid recovery in health and appearance.

The choice of hay for young calves is a frequent problem. Alfalfa hay is palatable and furnishes a liberal supply of protein and calcium. In many places it constitutes the only hay on the farm, and calves have been raised successfully on alfalfa. However, the use of alfalfa may cause trouble, and some cases of scours can be attributed to its use. Also the high protein and ash content may cause urinary troubles. If one has used alfalfa for young calves and has had favorable results he would better continue its use. It is well to limit its use for two or three months until danger of scours is past and during this time mixed hay, timothy or oat hay can be furnished. Red clover and alsike clover have given good results in calf feeding.

**Silage.** Practical feeders differ as to the use of silage for calves. Most of them feed silage even to the very young calves. At times calves have been found to develop scours when silage was supplied. The fact remains, however, that it is widely used and generally gives satisfaction. At the Iowa Station calves which had received silage at six weeks of age were found to do better than those without silage; they grew faster and the cost of gains was lower. In using silage care must be exercised to exclude any frozen or spoiled chunks and to clean the mangers of any refused silage.

**Roots.** Roots are a desirable feed for calves. When sliced, roots were found at the Iowa Station to give slightly larger gains than silage but were not so economical. No scouring resulted from their use, tho they were frequently frozen when fed or had softened as a result of thawing.

**Pasture.** There is little value in pasture for calves under six months of age, provided they are properly fed otherwise. When on pasture, the calves do get exercise, which is desirable, and they are generally more comfortable than in most calf pens. However, they can secure these advantages in a dry lot. Pasture often causes paunchiness in young calves that are receiving milk. Fall calves can go to pasture the following spring, but spring calves will derive no value from the pasture their first summer. Such calves can be better protected from the heat and flies in a good barn.

**Water.** Water is necessary for calves, even tho the calves
are quite young and are on a milk ration. It is most desirable to have water before them at all times, but watering in pails twice a day, or even once, has been found to give satisfactory results. When the calves are watered in pails in winter it is well to supply warmed water.

**Salt.** Salt should be furnished at will as soon as the calves start to eat grain and hay.

The best method for supplying salt is to furnish the common flaked salt in a separate box to which the calves have access. Calves do not eat the salt readily enough if rock salt or salt blocks are used.

Iodized salt to cure or prevent goiter is a desirable safeguard in many sections of the United States. Iowa is classed as semi-goitrous; few cases of goiter in calves have been observed in the state; yet the use of an iodine compound for the calves may prove beneficial. The commercial iodized salt which may be purchased is the effective way of meeting these needs.

**Mineral Supplements.** It has not been proved that mineral supplements are beneficial for young calves except in a few extreme conditions; in fact some workers have definitely concluded that supplements are generally useless. At the Michigan Station it was observed that raw rock phosphate was actually harmful presumably because of the fluorine it often carries as an impurity. Also certain complex mineral mixtures, especially those carrying Epsom's or Glauber's salts, copperas or sulfur, have been condemned.

At the Iowa Station results have been secured which indicate that heifers receiving mineral supplements grow somewhat faster than others. There is abundant evidence that mineral supplements are desirable for growing swine and beef cattle. It is difficult to understand why they would not also be desirable for young dairy animals. The use of them might prove to be effective insurance in calf raising.

**Cod Liver Oil.** The advisability of using cod liver oil in the ration for dairy calves is a disputed point, just as is the use of mineral supplements. Experimentally it has not been proved that cod liver oil is beneficial. However, in practice some dairymen have found it highly desirable. It would seem that if calves were failing to display the desired thrift and vigor, especially during winter seasons when the milk is deficient in its supply of vitamin D and when the sunshine is scant and impotent, the use of cod liver oil might prove highly desirable.

Apparently, the dairyman need give little heed to vitamins for his calves other than to vitamin D. Vitamin A is neces-
necessary in the ration for calves but it is nearly impossible to devise a calf ration that is desirable that does not carry an abundance of this vitamin. At Pennsylvania it has been shown that a calf or cow can get along with no vitamin B in the ration. At the Minnesota Station it was shown that calves did not need vitamin C.

**Self-Feeders for Dairy Calves**

The self-feeder for dairy calves has never been employed to any great extent. It is successful for fattening hogs and steers, and this has suggested to some the possibility of its use in dairy herds. A few experiments in self-feeding grains have been conducted and they show favorable results, but on the whole there is little value in self-feeding over hand-feeding. In a trial at the Iowa Station calves were given access to six different concentrates in the feeder until two years old. These concentrates were shelled corn, cracked corn, whole oats, ground oats, bran and linseed meal. The heifers on this trial grew exceedingly well and were larger and fatter at all times than heifers normally are, their weight being 30 percent greater at two years of age. One of them became so fat that difficulty in getting her safe in calf was attributed to her condition. Upon her removal from the self-feeder, which caused a lowering of her condition, she was safely bred. None of the heifers developed into a cow that can be considered superior to those that were hand-fed. The feed cost of growing the self-fed heifers was about the same as the hand-fed heifers and the labor required was about the same with both methods.

Some interesting facts are that calves and heifers are able to select feeds so that their ration is well balanced. They do show a decided preference when young for the whole corn and oats rather than for the ground grains. They also show a decided liking for linseed meal.

In another trial calves had access to a grain mixture in a feeder. These calves ate the grain in large quantities and grew well but no advantages could be ascribed to this method of feeding.

**The Growing Heifer**

When the calves are five or six months old they are generally weaned. At this time the bull calves should be separated for accidental breeding might otherwise result. After the heifers are weaned the common tendency is to neglect them for they have passed the calf stage and they become old enough partly to rough it for themselves. They cannot entirely subsist without care and any neglect will result in stunted cows with limited production.
TABLE V. THE INFLUENCE OF HEIFER FEEDING UPON PRODUCTIVITY

<table>
<thead>
<tr>
<th>Groups as based on age at arrival</th>
<th>Average production</th>
<th>Percent increase over mature cows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Milk pounds</td>
<td>Fat pounds</td>
</tr>
<tr>
<td>Mature</td>
<td>3,189</td>
<td>154</td>
</tr>
<tr>
<td>Four-year-olds</td>
<td>3,528</td>
<td>166</td>
</tr>
<tr>
<td>Heifers</td>
<td>4,038</td>
<td>191</td>
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</table>

The desirability of properly attending heifers is well demonstrated by some material obtained in the experiment with scrub cows at the Iowa Station previously referred to. To start this experiment 14 scrub females were purchased. Seven of these were young heifers, two were four years old and five were mature on arrival at the College Farm. Table V gives the production records of the scrubs of these different groups.

The animals which arrived at the farm as heifers carried the same breeding as the others. They were, however, subjected to good care and feed earlier in their lives and they developed into better cows. They produced 27 percent more milk and 24 percent more fat each year than did the cows that were mature upon arrival. Even the cows that were four years old showed some improvement over the older ones.

Pasture for Older Heifers Is Desirable

Fall calves can be weaned the next spring and turned on pasture. Little difficulty need be experienced in taking them thru this first summer, but they must be watched. During the first summer they should have some grain to supplement

Fig. 5. A thrifty, well grown, bred heifer.
the pasture. Many men hesitate to feed grain to heifers at this time, but grain feeding is profitable unless carried to an extreme. The capacity of these heifers is yet limited and they can not eat enough pasture to supply their needs. If they are in a pasture with the cows, a creep can be provided so that they can go to a manger at feeding time. A good grain mixture at this time is one containing equal parts of cracked corn and ground oats. These feeds are generally cheap and can profitably be fed in amounts as large as will be cleaned up. Another good plan is to have a rack of legume hay accessible during all of the summer season. Great quantities of hay will be consumed to the advantage of the heifers.

**Make Good Cows Out of the Yearlings**

In the fall the heifers should be taken into the barn early. It is not a good plan to wait until snow covers the pasture before starting the winter feed. If the heifers have been well attended during the summer they will go into the winter in good shape and they must be kept vigorous and growing. The change need not be harmful unless the heifers have suffered too long on frosted and dried pasture before the winter feeding starts. The object in feeding these yearling heifers is to develop them into large vigorous cows with ample capacity and constitution. Pampering the heifers is not good. Heifers can stand pretty cold weather in an open shed if properly attended to. Corn silage may be fed in large amounts, and 15 or 20 pounds a day will be eaten. No other roughage equals alfalfa hay and it can be fed in unlimited amounts. The heifers should have all the silage and alfalfa hay they will eat. If they do well and continue to grow they do not need grain till along in January or February. In January they will be bred for fall freshening as two-year-olds. Four or five pounds of grain can then be given daily. With silage and alfalfa hay, corn and oats make a good mixture. A high protein concentrate improves the mixture and can generally be used to advantage. Grain is well used on yearling heifers all winter unless they stay in good condition on roughages alone.

During the following summer the heifers will do well on pasture alone during May and June. When the hot weather comes they will need grain. A good plan is to take them into their stanchions and feed grain and get them accustomed to the barn before they freshen. If they are due to freshen in September or October, they should receive large quantities of grain. The mixture recommended of corn, oats and linseed meal is very good and it is profitable to feed this mixture up to six or eight pounds a day.

Spring calves cause more difficulty than fall calves. They
generally suffer from heat and flies during their first summer. Then weaning them and immediately putting them on winter feed often cause a setback. They will have to receive grain all the first winter for they cannot consume enough roughage to meet their needs. After this first winter they can go onto grass and be fed the same as the fall calves.

**Housing Facilities Are Important**

The calf barn should be clean, well lighted, well ventilated and warm. Ordinarily the calf pens are in the main milking barn and even in the winter time they will be sufficiently warm. Very young calves cannot stand too cold a barn but as long as it does not get so cold as to freeze the manure in the mornings the calves will not chill. If the calves get too cold, blankets can be made of burlap and can thus be kept comfortable. However, when blankets are used there is always the danger that they will be accidentally pulled off and thus give the calf a more severe chill than would occur if no blankets were used. Poor ventilation is more harmful than low temperatures in a barn. It is often disastrous to permit a draft of air from an open door or window to blow onto the calves.

Individual pens for each calf are desirable but not indispensable. They cost more and require more time but serve a good purpose in calf raising. They keep the calves from sucking each other; they make it possible to control the amount of feed each calf receives; and they help in checking disease. If
Fig. 7. Removing the horns with caustic when the calf is young is the easy and humane way of dehorning. Upper picture shows hair being clipped away around the small horn; Center, applying grease around horn to prevent caustic from spreading; Lower, caustic being applied directly to the horn.
individual pens are not available, stanchions should be installed for use at feeding time. After the calves are weaned, an open shed will be sufficient even in cold weather. This open shed gives ventilation and it results in more vigorous heifers than could be secured if they were tightly housed all winter.

**Dehorning**

Calves should be dehorned when about a week old. The best way is to use caustic potash for this purpose. It is safe and far more humane than waiting several months and using a saw or large dehorning clippers. When the calf is a week old the horns can be detected as small prominences covered with hair. To remove these scurs, clip the hairs over and around them, then take a stick of caustic potash, moisten it and rub vigorously on the horn till it gets red and the blood appears about to ooze thru. This is a very sure method and is not very painful. Two precautions are necessary in this procedure. The stick of potash must be wrapped at one end so the operator's hands will not be injured and too much water must be avoided so that it will not run down the face of the calf and remove the hair nor get into the eyes. There is a belief on the part of some that dehorning detracts from the appearance of a herd to a certain extent, but horned cows can do a great deal of damage to one another and a dehorned herd is more easily and satisfactorily handled.

**Removing Extra Teats**

Rudimentary teats often appear on the udders of the heifers. These teats are generally located behind and above the main teats tho they may appear as branches of a main teat or elsewhere on the udder. They generally secrete no milk but at times they do secrete and in certain places near the main teats they may cause annoyance in leaking milk. At best they are unsightly and may detract from the appearance of the cow's udder. They can be easily removed if the heifer is less than a year old. If she is more than a year old, it is probably best not to attempt to remove them.

To remove these teats rubber bands, threads or scissors are used. The latter plan gives good results. It is best to throw the heifer, apply iodine or any disinfectant to the teat and cut it off quickly with sharp scissors. The operation is not painful and seldom bleeds. Care must be exercised, however, in avoiding an infection from the scissors. There is difficulty on young heifers when all the teats are small in distinguishing rudimentary teats from the main ones. The disastrous results of removing the wrong teats are apparent.
Marking the Calves

In these days of larger herds with more calves to remember and with reliance upon hired men who frequently come and go, it is urgent that all calves be marked in some way at birth. The common method now-a-days is to tattoo a number in the calf’s ear and enter the number in the herd record. This method is inexpensive and leaves a permanent mark but has an objection in that close inspection is necessary to determine the numbers. Also a black ear does not show the ink used in the tattooing. However, even in case the ink is not visible the identification is positive and can be established by getting the tattooed ear in the line of vision toward a window or in extreme cases by holding a flash light behind the ear.

Another frequent method of marking calves is to insert a tag in the ear. However, these tags are often torn out thus losing the identification and making an unsightly ear.

A leather strap with a numbered brass tag is an excellent scheme for marking. However, these straps are expensive and they will wear out and become lost.

Free-Martins

When twins in cattle consist of a male and a female, the female is called a free-martin and in about 87 per cent of the cases is sterile. Cattle men know that in some cases these free-martins will prove to be breeders, so they are tempted to raise the heifer and take the chance that she will breed. But it is only a one to seven chance and is not justified except with animals of extremely valuable blood lines.

The cheapest and best thing in the long run is to veal the free-martins.

There are many mistaken notions about the breeding ability of cattle twins. With opposite sexed twins, even tho the female generally proves sterile, the male is not affected at all. Twin bulls or twin heifers are as perfectly sexed as a single bull or single heifer.

Diseases of Calves*

Calves, especially in the early stages of their development, are subject to a few common diseases. Some of these diseases are accompanied by high mortality, while others, tho not responsible for the deaths of so many calves, undoubtedly lead to a considerable amount of unthriftiness on the part of calves and consequently to a considerable financial loss to the farmer.

Prevention is undoubtedly the best treatment for calf troubles and with careful feeding and management consider-

*This section prepared by C. H. Covault, Associate Professor of Veterinary Medicine.
ably less trouble should be experienced with the more common calf diseases. When disease does make its appearance, "cure alls" should be carefully avoided. If the trouble cannot be treated successfully, a competent veterinarian should be called. The following suggestions, whose value has been proven by practical experience, are offered.

**Constipation.** (Retention of meconium). The newly born calf requires thecolostrum, or first milk, of its dam to assist in getting the bowels into good working order. Occasionally when the calf fails to receive the colostrum, the bowels remain inactive and the meconium is retained. Enemas consisting of a watery solution of soda or one-half teaspoonful of salt in one quart of water injected with a syringe or allowed to gravitate in thru a hose and funnel, (or an ordinary fountain syringe) relieve this condition. Soap and water irritants should be avoided. In older calves constipation is occasioned by improper feeding, such as lack of sufficient roughages. One of safest treatments for constipation is the administration of castor oil in doses of one to three ounces depending on the size and age of the calf.

**Indigestion.** Digestive derangements in calves may be due to a variety of causes. Among the more common are constipation, overfeeding, irregularity of feeding, feeding dirty milk or other feeds that are in bad condition, feeding from filthy containers, too rapid changes in feeds, or chills brought on by drafts or by damp, cold floors. The cause of the trouble should be immediately located and remedied and in addition the feed should be cut down and castor oil administered. Where abnormal fermentations due to dirty milk are the cause of the trouble, lime water may also be of value.

**Bloat.** This form of indigestion may be caused by abnormal fermentation in the stomach brought about by dirty milk and also by the calves sucking each other and thus drawing air into the stomach; and also by the calves swallowing the foam which is sometimes found on separated milk. The cause should be eliminated and castor oil administered. Sometimes a teaspoonful of ground Jamaica ginger given in hot water will be valuable in giving relief if the bloat is severe enough to cause colic.

**Scours or Dysentery.** Acute diarrhoea resulting from catarrh of the digestive tract caused by various forms of bacteria is more common among calves than among other newborn animals. Some of these various forms of diarrhoea are regarded by herdsmen as white scours. Overfeeding probably predisposes to this trouble. This rarely occurs when calves are nursing as the nourishment is taken frequently and in
smaller quantities. Fermented or partially soured milk, feeding from dirty pails and other unsanitary conditions are all contributing causes.

Common scours are all too prevalent among calves and can be prevented by proper care and feeding. The causes previously outlined predispose calves to the bacterial infection which is associated usually with dysentery. Milk too rich in butterfat may also be a contributing factor. When calves are comfortably housed and regularity, not only in regard to the time of feeding but also with regard to the quantity and quality of the milk and its temperature and cleanliness, is observed there will be little trouble from common scours. When this disease makes its appearance the milk ration should be cut down at least one-half. This relieves the digestive system and it can be assisted in freeing itself of obnoxious materials by the administration of one to three ounces of castor oil. Treatment with formalin also gives beneficial results. A stock solution of one part of commercial formalin to 31 parts of water is made and a teaspoonful of this is added to each pound of milk fed. When the trouble is under control the calf should be brought slowly back onto full feed. Where the calf is very weak and will not drink it can be kept nourished by the occasional administration of an egg. The shell of the egg is cracked and the egg, shell and all, put well back in the calf’s mouth which is held closed on the egg so that he will break it up and swallow it.

The stable or stall in which the calf is dropped should be thoroly cleaned and disinfected before the birth of the calf, and after the calf is dropped the stump of the umbilical cord should be thoroly cleansed with a 5 percent solution of creolin and then painted with one part of tincture of iodine in two parts of glycerin. This treatment should be repeated once each day for four or five days. It is believed that this method of treatment will largely prevent a more serious form of dysentery, known to herdsmen as white scours. If the disease has made its appearance a cathartic of two ounces of castor or four ounces of raw linseed oil should be given. Following this six grains of calomel may be given twice daily or the following may be used:

- Salol .................................................60 grains
- Bismuth subnitrate ..........................1½ drams
- Sodium bicarbonate .....................2 drams

Make five powders and give one in milk every six hours. This remedial treatment is equally beneficial for the milder forms of scours.

Hemorrhagic Septicemia and Blackleg. These two diseases are caused by germs and in some cases it is difficult to dis-
tistinguish between them, even when laboratory facilities for
diagnostic purposes are available. A vaccine now is being
used for each one of them with satisfactory results. However,
the vaccines are specific and the one is not effective in pre-
venting the other disease, so that a positive diagnosis must be
made before any vaccine is applied, if satisfactory results are
to be expected. At the outbreak of either disease the calves
should be put in charge of a veterinarian as it is only with
expert care that a cure can be accomplished.

Colds. Colds are frequent among calves and tho they may
not cause many deaths they retard the growth of the calves
and make them not only poorer in condition and stunted but
also more expensive. Well ventilated, dry barns and good
bedding will prevent colds. If colds are contracted they can
be cured by giving the calf a little extra attention, blanketing
if necessary, feeding warm milk and water and preventing
drafts.

Pneumonia. Pneumonia is commonly brought on by chill-
ing and should be treated by a veterinarian. The animal
should be kept in a well ventilated, tight barn which should be
cool rather than warm but not drafty. The animal should
be kept warm with a blanket. The bowels should be kept
open. Further treatment should be prescribed by a com-
petent veterinarian.

Mange. Many young animals become affected with mange
in the winter. The loss of hair is frequently confined to the
neck and the root of the tail but it may become generalized.
Treatment consists in the use of solutions of appropriate anti-
parasitics at two week intervals. The solution to be used can
be determined by consulting your veterinarian. The vet-
erinarian is guided by a number of factors in deciding what
to use.

Ring Worm. Ring worm is caused by a fungus and in
calves appears most frequently about the head, especially the
eyes and along the neck. The disease may be prevented from
spreading by keeping the healthy and infested animals
separated and thoroly cleansing the stalls. The crusts should
be removed by washing with soap and water after which the
diseased skin may be treated with sulfur-iodide ointment well
rubbed in, or tincture of iodine and iron, equal parts. Care
should be exercised to see that this does not get into the eyes
of the animal.

Lice. Lice are most prevalent on cattle in winter and may
become so abundant as to cause the animal great discomfort
and consequent loss of condition. They are more common in
stables where sanitation is lacking and may be seen along the neck and back of the animals. Calves infested with lice generally appear to be unthrifty and are poor doers. Treatment may be carried out by hand applications, spraying or dipping, or the animals may be washed with a good coal tar solution, and the treatment repeated again in about two weeks. If dipping is deemed expedient, Farmer's Bulletin 909 of the United States Department of Agriculture will prove helpful.

**Flies.** Flies cause considerable annoyance to young calves and it will usually be found convenient to spray the small ones in hot weather. A good home-made fly spray can be made from:

\[
\begin{align*}
4\frac{1}{2} & \text{ quarts of coal tar dip} \\
3 & \text{ quarts whale oil} \\
4\frac{1}{2} & \text{ quarts fish oil} \\
1\frac{1}{2} & \text{ quarts oil of tar} \\
3 & \text{ quarts coal oil}
\end{align*}
\]

Dissolve three pounds laundry soap in water, add the ingredients of the spray and bring the whole up to 30 gallons with luke warm soft water. This spray will keep off the flies, but it does soil the hide and hair. Purchased sprays, while more expensive, are cleaner and more conveniently handled.

**Warts.** Warts appear on the surface of the skin and may be single or multiple. Those most commonly seen have a roughened horny surface. They usually appear suddenly and often disappear in the same manner. Where they have a constricted base their disappearance may be hastened by rubbing them daily with a small amount of castor oil. When present in great numbers or when involving the eyelids or lips they should be removed surgically. Since malignant tumors sometimes develop on the skin the use of simple remedies should not be persisted in unless an accurate diagnosis has been made and malignancy excluded. It is always safest to be advised by the local veterinarian before attempting any form of treatment.