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Michigan State University Extension Service
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By

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MICHIGAN STATE COLLEGE

EXTENSION DIVISION

EAST LANSING

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RAISING DAIRY CALVES

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MOST CALVES ARE HEALTHY AT BIRTH

Dairy farmers interested in the problems of calf raising should recognize that most calves are in good health and normal condition when born. Usually the state of nutrition of a cow and her feeding during pregnancy have little, if any, effect on her calf at birth. An extreme general deterioration of a cow's health may result in a weakened calf, but such a condition is an exception. It must be realized that an iodine deficiency may occur in Michigan. Calves at birth may show the goitrous or "big neck" condition, but this can easily be prevented by using iodized salt for the pregnant cow.

A great amount of experimental work on the vitamin needs of the cow during pregnancy has been done. With extreme experimental rations a cow can be deprived of certain vitamins to the point where the fetus may be aborted or the calf may manifest a vitamin deficiency at birth. If cows over long periods are allowed only low quality roughage, which lacks carotene, there is a possibility their calves will suffer a deficiency of vitamin A and even when born alive may be blind or weak. However, cows that receive reasonably good roughages in accordance with approved practices are not believed to suffer from a notable lack of vitamins.

SIGNS TO OBSERVE IN HANDLING CALVES

The successful calf raiser is one who is alert in his observations so he can detect quickly if a calf is beginning to show some difficulty. If the man who attends the calves performs his work in a careless manner without taking time to watch them properly he may ignore a case for 10 or 12 hours until the next feeding, and then find any remedy is too late. This delay may also result in the spread of some disease to other calves in the barn.

A calf must be kept in vigorous, growing condition. It should have clear, bright eyes, erect ears and a desire to scamper when permitted. A healthy calf will stretch when it rises after lying down for sometime. The hair coat will be smooth but show evidence the calf has licked itself. When a calf is beyond 2 or 3 weeks old it will frequently be observed chewing the cud. On the other hand, a careful dairyman is concerned if a calf's feces are too soft or too firm or if the calf stands in a drooping position with head down and feet placed too close together. He especially fears to observe a calf that is coughing, breathing rapidly, or showing a discharge from the nostrils. When any unfavorable sign is detected immediate steps must be taken to ascertain and correct the possible cause.

NORMAL WEIGHTS OF DAIRY HEIFERS

In a dairyman's desire to keep a calf growing properly, he may make use of normal weights of animals of different ages as given in Table 1. He can compare the weights of his own calves with the figures given and thus form fairly accurate judgment as to the progress his calves are making.

Table 1. Normal weights, in pounds, of dairy heifers.*

Age in months	Jerseys	Guernseys	Ayrshires	Holsteins
Birth	54	65	73	91
1	68	79	88	113
2	92	105	115	150
4	164	177	194	250
6	250	267	287	365
8	331	350	384	474
10	402	427	467	568
12	462	490	535	653
14	518	556	598	725
16	568	605	652	795
18	615	663	709	861
20	658	712	766	928
22	702	763	815	999
24	750	818	860	1,075

*Taken with the permission of the Morrison Publishing Company, Ithaca, New York from *Feeds and Feeding*, 20th edition, by F. B. Morrison.

Fig. 1. Measuring the chest girth to estimate the weight of a calf from data in Table 2.

Smaller calves up to 100 pounds may be weighed on a small platform scales or their weights can be fairly accurately estimated by lifting them. For larger calves when livestock scales are not available, an estimate of the weight can be obtained from the chest-girth measurements as indicated in Table 2.

Table 2. Estimated weights of dairy heifers from various chest girths.*

Chest girth (inches)	Weight in pounds				
	Jersey	Guernsey	Ayrshire	Holstein	Average
24	47	43	43	51	46
26	59	54	54	64	58
28	72	67	67	78	71
30	88	82	82	95	87
32	106	99	99	113	104
34	125	118	118	134	124
36	147	140	139	156	146
38	172	163	162	181	170
40	199	190	188	209	196
42	228	219	216	239	226
44	260	250	247	272	257
46	295	285	281	307	292
48	333	323	317	345	330
50	373	364	357	386	370
52	417	407	400	430	414
54	464	455	446	477	460
56	515	506	495	527	511
58	568	560	548	580	564
60	626	618	604	637	621
62	686	680	664	697	683
64	751	746	727	761	746
66	819	815	794	828	814
68	891	889	866	899	886
70	967	968	941	973	962
72	1,048	1,050	1,021	1,052	1,043

*From Nebraska Agric. Exp. Sta. Res. Bull. 91.

To make use of the figures in Table 2, a measuring tape is placed around the animal's chest directly back of the legs with the animal standing squarely on all feet. From the size of the girth thus determined, the corresponding estimate of weight is read.

MATERNITY PEN

A dairy barn should have at least one maternity pen for every 8 or 9 cows in the herd. The pen should be at least 10 x 12 feet in dimensions and properly located to avoid exposure to adverse weather. When a cow is judged to be within 24 hours of freshening she should be removed to this pen, it having been put in proper condition. All manure and old bedding should be removed. The walls and floor should be scraped and scrubbed with a washing powder solution or a hot 1-per cent lye solution made with a 12-ounce can of lye in 10 gallons of water. If a washing powder is used for the scrubbing, the pen should then be disinfected with a suitable creosol or chlorine solution and then well bedded.

ATTENTION AT CALVING TIME

The birth of a calf is a critical period for it as well as for the cow, though there is little occasion for anxiety if the calf is full term and the cow is in proper condition. When the dairyman has concluded the calf will come within an hour or two he should plan to make frequent observations, but it is not necessary nor advisable to keep the cow under constant view. Usually a cow will not need assistance in calving, and it is better not to enter her stall unnecessarily. If delivery is not made shortly after labor commences some special difficulty may exist and the possible cause should be ascertained. If the presentation is abnormal the service of a veterinarian is needed. Often with the necessary adjustment the cow will deliver the calf without further assistance.

FIRST ATTENTION AFTER CALF IS BORN

When the calf is born the first act of the dairyman is to see that it starts breathing. Mucus or phlegm is removed from the mouth and nose. Blowing in a calf's mouth can dislodge some of the phlegm not reached with a finger. If the calf lies motionless and fails to emit a

Fig. 2. When a calf is born the first concern of the dairyman is that it breathes normally. The next step is to disinfect the navel with tincture of iodine. This is a precaution against disease.

sound some method must be used to induce respiration. Taking hold of the calf's rear legs and suddenly lifting it clear of the floor with the head down or slapping its chest may produce the desired effect. Sometimes the calf is dashed with cold water; alternate compression and relaxation of the chest—artificial respiration—may be used successfully.

As soon as the calf breathes, the navel should be disinfected as a precaution against disease. The substance from the adhering end of the navel cord is squeezed out and the navel painted with iodine. The use of powdered alum helps to dry the parts. A cow should be given all the warm water she wishes to drink as soon as she delivers the calf.

The next step for the attendant is to clean the pen of all expelled membranes and soiled bedding. Usually a cow will immediately lick her calf which helps to dry and clean it. If the cow fails to do this, the calf should be rubbed vigorously with a towel or burlap.

Before a calf stands to nurse, the cow's udder and teats should be washed with a chlorine solution. This is another precaution to avoid infection. Normally, a calf will stand and suck within 15 to 30 minutes. If it fails to do this, assistance should be rendered. The colostrum, or first milk secreted, invigorates the calf and has the desired laxative effect. Within an hour or so after the calf receives the first colostrum it should have evacuated its bowels of the first feces, or meconium, which is the yellowish material accumulated in the alimentary tract of the fetus. Careful examination of the bedding is desirable to ascertain if this material has been eliminated. If this is not passed within the allotted hour or two, an enema of one-half teaspoonful of soda or salt in a quart of warm water should be given.

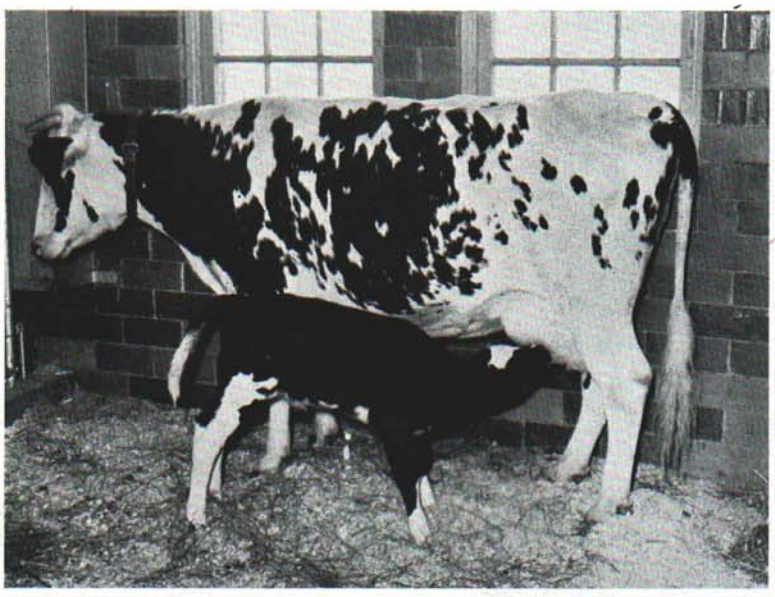

Fig. 3. A 2-day-old calf receiving her last meal before she is separated from the mother.

FOR THE FIRST TWO OR THREE DAYS

It is usual practice to leave the calf in the pen with the cow for two or three days. The calf thus obtains the colostrum and nurses frequently. Some dairymen leave the calf with the cow until the milk is suitable for human use, or for four or five days. The longer use of the colostrum and longer period of nursing are beneficial, but the cow may give too much milk for the calf to consume. Also after such a long period both the cow and calf are more disturbed when finally separated.

While the calf is still with her, the cow must be milked at least twice a day. This allows the dairyman to detect a quarter the calf may have neglected. He can also partly control the amount of milk the calf receives. If too much milk is left in the udder it delays the disappearance of the congestion and may lead to difficulties. However, there is a precaution here in that good cows should not be milked entirely dry for the first two or three days. Leaving some milk in the udder tends to prevent milk fever.

HAND FEEDING THE USUAL PRACTICE

While the successful operation of a dairy herd usually requires that a calf be separated from its mother after it has obtained the colostrum milk for two or three days, hand feeding often introduces problems. Results of studies in other states as well as in Michigan reveal that 14 or 15 per cent of the heifer calves that are born alive die before they reach producing age. In Iowa it was found that 6 per cent of the heifers died before they were one month old; 5 per cent died between one and three months; only 3 per cent died after they passed the age of three months. The natural procedure is for a calf to nurse its mother; the conditions under hand feeding are likely responsible for a part of the high mortality in dairy calves. When calves are handled with every precaution the hazards are reduced and successful results can be secured.

USE OF NURSE COWS SOMETIMES THE PRACTICE

A few dairymen make use of nurse cows in raising their calves. This generally proves successful though it is not feasible in all herds. The men who use the nurse cows generally feel that the milk which the calf obtains by nursing cannot be valued at full market price. The labor costs in milking, handling the pails, cooling and hauling the milk are not incurred. It is the usual practice to allow several calves to suck one cow. The calves are thus carried past the critical age, and as other calves are born they take the place of older ones. The cow used for nursing calves is usually one of the less valuable animals in the herd; this is a good way to handle a hard milker or some cow that

otherwise causes trouble. A low tester is preferable; a grade cow in a purebred herd or even a cow of another breed can often be used to advantage.

CALF PENS

Calf pens must be kept clean, dry and well bedded. As long as calves are healthy, fairly low temperatures are not serious, though it is preferred that freezing be avoided. An effort to maintain too high a temperature in colder weather often is made by eliminating all ventilation. This results in dampness; when doors are opened serious drafts occur. If calf pens are in the main part of the barn they will usually be kept warm enough by the animal heat from the cows. In more elaborate barns, artificial heat is sometimes furnished the calves, but it has been the experience at Michigan State College that such heating is often injurious: A calf thus handled suffers greatly with even the slightest exposures, which are difficult to avoid.

Calf quarters also need attention from the standpoint of summer conditions. A lack of proper cleanliness may be more serious in summer than in winter because of excessive putrefaction and the fly nuisance. It is important that calves be protected from flies as a matter of health as well as comfort. Keeping the pens and premises clean and darkening of windows will help control flies.

In recent years many dairymen have installed in the calf pens mesh wire, slats or steel grating to elevate the calves 3 or 4 inches off the cold floor. A special calf mat, of expanded steel grating, has been designed for this and can be purchased in sections ready to be laid on the floor. Some dairymen have built their own calf mats using a frame-work of 4 x 4's with heavy screen. In small pens, the entire floor is covered; in larger pens the mat is laid in a corner or in half the pen. Bedding is placed on the mat; the urine drains through, thus keeping the bedding drier. Calves exhibit a pronounced preference for the warmer, drier bed.

It is desirable that the young calf should have an individual pen until it is about 4 weeks old. A calf at this age requires about 18 square feet of floor space; hence the pen should be at least 3½ x 5 feet in dimensions. The individual pen permits the individual attention to a calf; it also prevents calves from sucking one another. If a calf becomes sick there is less likelihood that it will infect other calves to the point where an epidemic develops. Steel pens are desirable from the standpoint of convenience and cleanliness, but many farmers have built their own pens from scrap lumber or other material they may have available.

If calves are confined together, stanchions or ties are necessary to secure them when milk is fed. The calves should be kept tied after the milk is fed until they eat some grain and are thus curbed in their desire to suck. A calf 2 or 3 months old should have 30 to 35 square feet of floor space. Crowding of too many calves in a given space makes it difficult to keep the pen clean and dry.

THE WHOLE MILK PERIOD

From the time a calf is removed from the cow at 2 or 3 days of age until it is a month old is a period of importance. If it can be brought through this period successfully its chances of development are materially improved. Whole milk is essential. Because milk with a high fat percentage is more likely to cause scours, a low-testing cow can often be used to advantage. Where this is not feasible the richer milk can well be diluted by using 1 part of warm water to 2 parts of milk.

Fig. 4. Careful weighing of milk for the calves is a desirable practice.

The most frequent error in handling calves is overfeeding. The following is a good rule that should be observed to determine the amount of milk to use: **Feed 1 pound of milk a day for each 10 pounds of the calf's weight.** For the first week even less milk is desirable. The milk should be at a temperature of 90° to 95° when offered the calves. Regularity in feeding at the same times each day should be observed. For younger calves the three-time a day feeding is considered preferable. It is important that the pails used for calves be properly cleaned and sterilized after each feeding.

The Nipple Pail—The nipple pail for calf feeding has been perfected recently and has come into great favor. This pail has a hard rubber nipple that can be detached. Within the nipple is a valve that restricts the stream of milk the calf can obtain at each swallow. The pail is secured to the pen at about the elevation of the calf's head, and the calf readily uses it but cannot drink too fast. A calf spends about five times as long a period obtaining a given quantity from a nipple pail as from a common pail. This device is more troublesome than the common pail to clean and sterilize and if neglected is very likely to induce scours.

Fig. 5. The nipple pail has advantages in calf raising.

AFTER THE CALF IS THREE WEEKS OLD

Despite the fact some men have reported success when whole milk is entirely replaced with skimmilk when the calf is two weeks old, it has been the experience at Michigan State College that such restriction may lead to troubles. In Table 3, two plans of feeding are outlined. Plan I, involving the more customary practice of using whole milk at first and then replacing it with skimmilk, suggests that the change be made in the fourth week. The change should be made gradually, replacing an additional pound or two of whole milk with an equal quantity of skimmilk. If skimmilk is not available, buttermilk or whey can be used. Some dairymen with no skimmilk choose to procure dried skimmilk or buttermilk and reconstitute these products to liquid form which is then fed in the quantities recommended for liquid skimmilk.

Table 3. Daily milk and concentrates for calves under two plans of feeding.

(Free access to hay.)

	Age of calf	Pounds of milk	Pounds of concentrates
PLAN I Using whole milk then skimmilk	1-2 days	With cow	—
	3-7 days	4-9 lb. whole milk	—
	2nd week	5-10 lb. whole milk	—
	3rd week	6-12 lb. whole milk	⅛ lb. cereal grain
	4th week	8-12 lb. whole milk and change to skimmilk	¼ lb. cereal grain
	5th-6th weeks	10-12 lb. skimmilk	½ lb. cereal grain
	7th-8th weeks	10-12 lb. skimmilk	¾ lb. concentrate mixture
	3rd month	12-14 lb. skimmilk	1 lb. concentrate mixture
	4th-5th months	14-18 lb. skimmilk	2-3 lb. concentrate mixture
PLAN II Using whole milk with calf meal (or pellets)	1st-2nd weeks	Same as PLAN I	—
	3rd week	6-10 lb. whole milk	½ lb. calf meal
	4th week	6-10 lb. whole milk	1 lb. calf meal
	5th week	4-6 lb. whole milk	Free access, calf meal
	6th week	2-4 lb. whole milk	Free access, calf meal
	7th week	Off milk entirely	Free access, calf meal
	To 5th month	No milk	Up to 5 lb. calf meal

Plan II of Table 3 applies to those farms where no skimmilk nor other liquid by-products are available. Neither is the purchase of powder considered feasible. Here the whole milk is continued to six weeks and no other milk by-product is used. The calf meal (or pellets) plays the important role. If a commercial meal is used it should be fed in amounts recommended by the manufacturer.

In Table 3 the lower amounts indicated are for smaller calves while the higher figures apply for larger ones.

USING SKIMMILK

The heifers may be continued on skimmilk until 5 or 6 months old or even to 10 or 12 months if available in sufficient quantity. However, they must not be gorged with too large quantities daily. From 14 to 18 pounds daily is the maximum amount that should ever be fed dairy heifers. They develop better when skimmilk is limited.

BUTTERMILK AND WHEY

If skimmilk is not available but buttermilk or whey can be obtained the latter give fairly good results. They are to be used in the same amounts as skimmilk. Buttermilk is very similar to skimmilk in composition and is considerably more valuable than whey, which contains

Fig. 6. The young calf should be marked for identification. Jerseys and Brown Swiss must be tattooed before they can be registered. (Upper)—Inserting the tattoo numbers with the special pliers that carry the figures and letters to pierce the ear. India ink is rubbed on the ear before the perforation is made—then thoroughly rubbed in. Care should be exercised to avoid a large blood vessel. A card board between the ear and the back jaw of the pliers improves the job. (Lower)—An ear showing the figures. Letters can be inserted in the same or in the other ear.

Fig. 7. Numbered metal ear tags are frequently used to mark calves. (Upper)—The tag is inserted in the special pliers. One lip of the tag is sharpened to penetrate the ear and then clamp into the other lip. (Lower)—The tag is inserted on the top edge of the ear, but not too snugly. Space must be left for growth of the ear.

Fig. 8. The best time to dehorn heifer calves is when they are about a week old. Caustic is commonly used. (Upper) Clipping the hair closely around the horn-button. (Middle) A ring of grease around the area prevents the caustic from running down the face. (Lower) The stick of caustic is wrapped to protect the fingers, then rubbed on the button in an area about the size of a dime until the hide at the tip of the horn-button is broken.

but little of the milk proteins. When whey is used the grain mixture allowed the calves must contain a much higher proportion of the high protein concentrates than is necessary with either the skimmilk or buttermilk.

DRIED SKIM AND DRIED BUTTERMILK

A pound of dried skimmilk or dried buttermilk properly mixed with 9 pounds of water gives a product nearly equal in feeding value to the original fluid products. Some care is necessary in reconstituting these products. The desired quantity of the powder should be mixed first with a small amount of cold water to give a smooth paste. Then hot water is added to obtain the desired dilution and the proper temperature of 90° to 95°. The reconstituted product is fed in the amounts recommended for skimmilk.

CALF MEALS (OR PELLETS)

Calf meals are usually intended as substitutes for milk products. The better ones contain a wide variety of components and have proved quite satisfactory. However, it is generally acknowledged that no meal yet devised is fully equal to milk. Often the term "calf starter" is applied to those products. In recent years, manufacturers have perfected procedures so that the meal is pressed into small pellets. To give best results, a meal must contain a wide assortment of ingredients to supply the necessary vitamins, minerals and animal proteins. At least 20 per cent of protein in the meal is desired, and the fiber content must be held below 5 per cent.

A simple home-mixed meal that has been used with some success is one consisting of: 100 pounds yellow corn meal, 150 pounds ground oats, 25 pounds wheat bran, 50 pounds linseed meal, 75 pounds dried skimmilk, 6 pounds salt and 6 pounds steamed bone meal.

As indicated under Plan II of Table 3, calves are induced to eat the meal at the earliest date. All milk feeding is discontinued by the seventh week. Most dairymen obtain good results when some cereal grain is mixed with the meal. By the fifth month the meal can well be replaced with a cheaper grain mixture.

GRAIN MIXTURES

With either plan of feeding it is of importance to induce calves to eat grain as soon as possible. At first, calves prefer whole grains but after they are 10 or 12 weeks old a ground grain mixture as follows has proved satisfactory: 100 pounds of yellow corn meal, 150 pounds ground oats, 100 pounds bran, 50 pounds of a high-protein concentrate, 3 pounds of salt, and 3 pounds of steamed bone meal. Considerable modification of this grain mixture is acceptable. Some dairymen merely use the same grain mixture for the calves as they feed the cows.

OTHER FEEDS FOR CALVES

Opinions differ as to the preferred kind of hay for calves. Some dairymen believe that alfalfa may aggravate the difficulties with scours and they prefer to feed alsike, mixed hay or some non-legume. Nevertheless, one of the chief objectives in feeding hay to calves is to assure an adequate supply of vitamins A and D. Good quality, sun-cured alfalfa hay is the choicest source of these vitamins and is especially desired after whole milk feeding is discontinued.

It is usually preferred to avoid silage for calves until they are at least four months old. It may cause scours. When a calf is four months old it can handle 2 or 3 pounds of silage a day. For each additional month of age the daily consumption will increase about one pound.

A dairy calf should not be turned onto pasture until it is weaned from milk. While pasture contains valuable nutrients the combination of pasture with milk often proves undesirable. Exercise and sunlight for calves can be provided by turning them into a suitable lot.

WATER AND SALT

While calves are receiving milk the need for extra drinking water is small though they will take small quantities. The water should be at a temperature of 90° to 95° F. If water is used to dilute high-test milk, any additional quantities would be questionable. Some farmers have success in giving 2 or 3 pounds of warmed water in the pail as the calf finishes drinking the milk. This may produce an extreme fill even to the point of some discomfort but it does not cause scours as often supposed.

The best method of furnishing salt to calves is to supply the ordinary flaked salt in a box. Iodine can well be provided in the salt as a protection against goiter. Commercial iodized salt can be purchased, or the dairyman may do his own mixing by adding one-third ounce of potassium iodide to 100 pounds of salt. Sometimes it may be desirable to mix the salt with steamed bone meal in equal parts.

MORE COMMON DISEASES AND AILMENTS*

Common Scours—This is the type of scours that accompanies a digestive disturbance. The most evident symptom is the soft, foul-smelling feces. The calf also exhibits weakness and lack of vigor. It stands in a drooping position with the eyes dull and the hair coat rough. A frequent cause of this type of scours is over-feeding of milk. Other causes are a too sudden change in feeds, milk that is too rich, or irregularity in the temperature of milk or time of feeding. Contaminated

*This section was prepared by B. J. Killham, Extension Specialist in Animal Pathology.

utensils and pens, or sudden chills and drafts are frequent causes of scours. An affected calf is highly susceptible to other diseases such as pneumonia.

The first treatment for a case of scours is to reduce the milk allowance about half. A practice found to be effective is to give 2 ounces of castor oil in a half pint of milk followed in 4 or 5 hours with a level teaspoonful of bismuth subnitrate in a half pint of milk.

White Scours—This is a less frequent but highly fatal type of scours due to an infection. This is one disease with which a calf may be infected at birth. Sanitary precautions as described previously should be observed in handling the cow and calf at the time of freshening if this disease is to be prevented. It is highly desirable that the calf obtain plenty of the colostrum because that material among other virtues increases the calf's resistance to germ invasion.

All the symptoms of common scours will be exhibited by a calf with white scours but to a more severe degree. The feces often have a white tinge from which the name of the disease comes. Sometimes streaks of blood are visible. In cases of this disease a veterinarian should be called immediately. He will usually give particular attention to the prevention of the spread of the disease to other calves, and in many cases he will immunize the calves with the anti-white scours serum.

Pneumonia—This is mildly contagious and is often caused by some predisposing cause such as scours or colds. A calf barn that is too warm or damp or that exposes the calves to sudden chills must be avoided. Pneumonia is more common in the winter but may also occur in other seasons. Symptoms of the disease are rapid and labored breathing, coughing, fever, and listlessness. At the first sign of this disease a veterinarian should be called. The calf must be made as comfortable as possible, even to the extent of blanketing it securely and placing it in a room not too warm but free of drafts and dampness. Careful handling is exceedingly important in dealing with this disease.

Colds—Slight colds among calves are frequent and while not serious themselves they may lead to more pronounced difficulties such as scours and pneumonia. With a cold a calf shows frequent coughing with a nasal discharge and roughening of the hair. The best treatment is to employ extra attention in providing dry, well-bedded pens without drafts.

Calfhood Vaccination—Considerable interest has developed among dairymen regarding the feasibility of calfhood vaccination against Bang's disease. This is not done in the interest of the calves themselves but with a view to establishing an immunity which will persist and protect the animals against the disease later in life. Whether a dairyman should use calfhood vaccination for Bang's disease depends entirely on his individual situation and nothing should be done except under the counsel of a competent veterinarian. The evidence indicates that if calfhood vaccination is decided upon it must be done while the calves are four to eight months old.

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