

UNIVERSITY OF MISSOURI
COLLEGE OF AGRICULTURE
Agricultural Experiment Station

COLUMBIA, MISSOURI, MARCH, 1911

CIRCULAR NO. 47

RAISING CALVES ON SKIM-MILK

C. H. ECKLES. G. C. WHITE.

Importance of Calf Raising.--The success of the dairy farmer depends to no slight extent upon the careful rearing of calves. This is especially true since dairy cows have reached the present high market price. Most farmers begin with ordinary cows or the best



Skim-Milk Calves in Pasture.

they can get close at home. As a rule this is the best plan to follow. The development of a high class herd from these will depend largely upon three things:

1. The careful selection of individual cows.
2. The use of a good pure bred sire.
3. The careful raising of the heifer calves from the best cows.

Care of the Cow at Calving.—The cow should be in good flesh at calving time for the best results in milk. She should be dry six weeks. During the pasturing season there is no better plan than to leave her in the pasture, of course under observation, until the calf is born. If the cow is kept at the barn at calving time she should have a roomy clean stall where the calf will not get navel infection from filth.

Raising Calves by Hand.—The dairy calf is ordinarily raised by hand since the milk of the dairy cow is usually worth so much more than the calf that it receives the first consideration. It is a well established fact that a calf raised on skim-milk is equally as good as one nursed by its mother. In localities familiar with dairying this is well understood, but in other places is virtually unknown and a strong prejudice exists against feeding skim-milk on account of the unhealthy and undersized calves that have been raised in this way. Such calves are the victims of ignorance or carelessness. The skim-milk calf raised properly differs little, if any, in size, quality, thrift, and value from the same animal when raised by the cow. The poor results which have so often followed the feeding of skim-milk have been due to the faulty methods, and not because the cream which has been taken out is of so much importance to the calf.

Skim-milk does not differ from whole milk except in butter fat content. The following figures give the average composition of each in parts per 100:

	Whole Milk.	Skim-milk.
Water	87.1	90.5
Fat	3.9	0.1
Protein { Casein }	3.4	3.57
{ Albumin }		
Sugar	4.75	4.95
Ash	0.75	0.78

The skim-milk differs from the unskimmed only in the amount of fat it contains. The fat is not the most important part of the milk for the calf. The protein builds up the muscles, nerves, hair, hoofs, and horns while the ash is used for building the bones. Protein is the curd of the milk which is seen when milk sours. The fat in the milk does not go to form growth in the animal but furnishes heat and fat on the body. A substitute for the fat can be supplied much cheaper with grains such as corn. The calf fed on skim-milk is not generally quite so fat during the first six months of its life as the one nursed by the cow but often has a better development of bone and muscle.

Amount of Feed Required.—The total amount of feed required to raise a calf to six months of age is about as follows :

Whole milk	90—200 lbs.
Skim-milk	2300—3000 lbs.
Grain	150 lbs.
Hay (or pasture)	500 lbs.

It has been found by trial that two pounds of grain replace one pound of butter fat consumed in the milk. From this the economy of skim-milk as a feed is apparent, since a pound of butter is worth from 20 to 30 times as much as a pound of grain. Calves raised on skim-milk should gain on an average about $1\frac{1}{2}$ pounds per day up to six months of age.

Taking the Calf from Its Mother.—The first milk of the cow after calving is called colostrum. It is important to feed this milk for a few days at first since the calf seems to need the colostrum milk to start the organs of digestion properly. After a few days mixed milk may be given. In case the milk is very rich in fat it will be best even with the young calf to dilute it with skim-milk, as rich milk is liable to cause indigestion.

There is some difference in practice regarding the time to begin hand feeding. Some do not allow the calf to nurse at all. Others prefer to let it nurse once, and some allow it to remain with the cow three or four days, or until the fever is out of the udder. When it is impossible to feed the calf often it is best to let them remain about two days as at first they take food often and in small amounts. The earlier the calf is taken away from the cow the easier it will be taught to drink milk from the bucket. If the cow's udder is in good condition, it is more satisfactory to take the calf away early but when the udder is caked it is best to leave the calf with the mother for a few days.

Amount of Milk to Feed.—Under natural conditions the calf takes its milk frequently and in small quantities. The calf's stomach at this time is small and an excessive amount always results in indigestion and scours. For the first two weeks, five or six quarts, or about ten or twelve pounds per day, is all the largest calf should be allowed to take. A small calf, as a Jersey, does not need over eight or ten pounds per day on the start. This may be fed in two feeds per day, or better, in three for two or three weeks. As the calf grows older somewhat more milk may be used, but at no time does it need over sixteen or eighteen pounds, or eight or nine quarts per day, but it is safe and economical to feed as high as twenty pounds to a large calf, if skim-milk is plentiful. Overfeeding is the most common cause of poor success in calf raising. It is a mistake to think that because the cream has been removed the calf needs more of the skim-milk, or that because the calf is not doing well it is not getting enough milk, and

to allow it to gorge itself, which it will readily do, if given an opportunity. A good rule is to always keep the calf a little hungry. Some provision must be made for making certain that each animal gets its share and no more. Some drink twice as fast as others, and if fed together some will be overfed and others will get too little. The plan sometimes used for feeding a number of calves together in a long trough gives bad results for this reason, and should never be followed.

Changing to Skim-milk.—At the end of two weeks the strong and vigorous calf can be changed to skim-milk. This is done gradually and not by abrupt change. About a week should be taken to make the complete change, replacing a pound or two of whole milk with an equal quantity of skim-milk each day until the change is complete. The milk may then be increased to 14 or 15 pounds per day.

Temperature an Important Factor.—Another very important precaution that must be taken is to have the milk warm and sweet when fed. Nature furnishes the milk to the calf in this condition, and we must carefully imitate her. Nothing will more quickly upset the digestion of the calf as feeding warm milk at one feed and cold at another. For the first few weeks the calf is especially sensitive to the temperature of its feed. After the calf is three or four months old it may take cooler milk but in this case the milk should be cool all the time. The best results are obtained with warm milk, however, at all ages. The temperature of the milk when it comes from the cow is about 100° F. If separated immediately it can be fed without warming and will be above 90°. However in the cooler season, say from October to April, it is necessary to warm it artificially.

Feed Sweet Milk from Clean Pails.—Old or stale milk often causes indigestion or scours. A calf is better off to miss a feed than to have a feed of sour milk. Pails and utensils must be kept clean. A good rule is to keep the calf pails as clean as the milk pails. The hand separator on the farm makes it possible to get the milk to the calf fresh, warm and sweet. Calves can be raised on skim-milk where the cream is raised by gravity but more difficulties are experienced.

Feeding Grain.—The calf which is to be raised on skim-milk should be taught to eat grain early. When they have access to it, many of them will begin eating grain at two weeks of age or three at the latest. The grain should be placed in a box where they can easily get to it and they can be encouraged at first by placing a little in their mouth after they have consumed their milk. Grain can best be fed dry after the milk is fed. In no case should it be fed in the milk as in that case it will be gulped down without chewing which is bad for the digestion. After a calf begins to eat considerable, grain should not be kept before it. No more should be given than will be eaten up twice each day, which will not be over one-half pound daily for

the first two months. After this they may have more but it will not be necessary to feed more than one pound per day up to six months unless it is desired to push them rapidly. If grain is allowed to remain in the trough, it often becomes damp and decayed, and may cause sickness, just as a dirty pail may do.

In feeding grain one must keep in mind that the first object of the grain is to supply fat which is deficient in the skim-milk. Many experiments have been made since the hand separator came into use, to find what grains are best adapted for this purpose. It was at first assumed that linseed oil meal was the best but since corn is high in starchy foods and fats it fills the requirements just as well and is cheaper. Oats are also good. An equal mixture of corn meal and whole or crushed oats can hardly be improved upon for supplementing skim-milk. Corn meal alone is as good as any for the young calf but after two or three months it can eat shelled corn just as well. The feeding of other prepared foods is not essential in raising skim-milk calves and is too troublesome and expensive.

Feeding of Hay and Pasturing.—Calves will begin to nibble hay almost as soon as they will eat grain. For young calves timothy or mixed hay is well adapted as clovers and alfalfa are laxative and so palatable the animal often over eats and this helps produce scours. After three or four months they should by all means be fed some of the legume hays (alfalfa, clover or cowpea) on account of the bone and growth producing elements this class contains. When on pasture the calves are receiving the best possible roughness.

Water and Salt.—It is a mistake to believe that a calf does not require water while still receiving milk. An abundance of clean water should be given at all times and salt after the animal is old enough to eat grain and hay.

Milk Substitutes.—Where the whole milk is used the problem is to raise the calf by using as little milk as possible. It is important that the calf be fed milk while it is young but where milk is scarce or expensive they may be raised from three months on with substitutes.

Fall or Spring Calves.—While the question as to whether calves should be dropped in the fall or spring may be decided by special conditions, on the whole fall calves have superior advantages. They come at such a time that work is not urgent and they can have the best attention of the feeder. The disadvantages of winter feeding are more than off-set by hot weather and annoyance from flies. The fall calf is weaned in the spring and can be put on grass without further attention, while the spring calf goes on dry feed when weaned. For the first three months it does not matter materially whether calves are eating hay or pasture, but the second six months they will do

better on grass than any other ration. Ordinarily the cow which calves in the fall will produce a greater yield during the year as the summer grass stimulates secretion during the latter part of lactation.

Clean Pens and Barns Important.—The calf quarters should not be allowed to accumulate a lot of damp, dirty materials as this is almost sure to result in sickness and bad results. The bedding should be rather abundant and changed often. In order that the stalls or pens be kept clean they should be in the choicest part of the barn where sunshine and light are abundant. In summer they should have access to a pasture where there is plenty of shade.

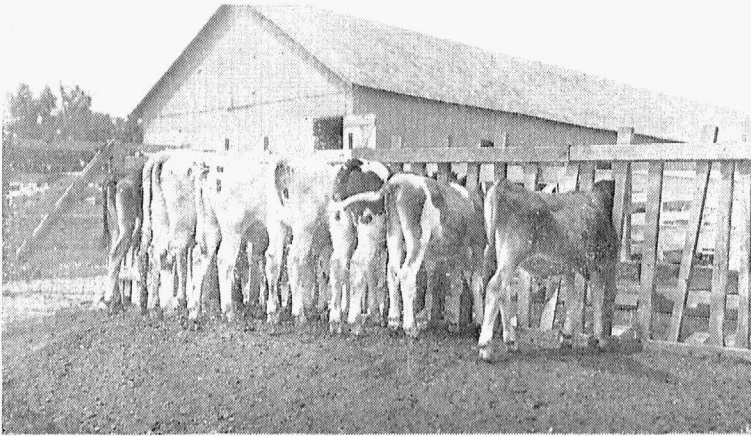
Where valuable calves are raised it is advisable to have a separate pen for each animal. This enables the feeder to examine the calves more closely and to detect any unusual conditions, especially foul smelling dung which is an indication of digestive disorders. Scours are far easier to control when detected in their early stages and proper precautions taken. The next best arrangement is the stanchion which is used to confine the calves while eating milk and grain. This enables the feeder to see that each calf gets its share and is more convenient than the use of halters. Calves fed in a trough do not do well as some eat much faster than others and a trough is a source of filth.

Calf Scours.—The most common trouble in calf raising is scours, or indigestion. This is brought about by overfeeding, feeding sour or old milk, cold milk, and dirty pails, troughs or stalls. Success depends largely upon the ability of the feeder to prevent scours.

White Scours.—One kind of scours is an infectious disease which gains access to the body soon after birth through the freshly broken navel cord. It usually occurs within a week and often within 48 hours after the calf is born and runs its course quickly. The symptoms are sudden, severe sickness, sunken eyes and usually a white, foul smelling dung. If one calf has become infected others are liable to contract the disease and die in the same manner. It is important to thoroughly disinfect box stalls where calves are dropped and have them well bedded with clean straw. It is always a good plan to disinfect the navel cord when the calf is born and, if there is reason to suspect they might contract the disease, extra precautions should be taken such as singeing the cord with a hot iron which stops up the opening or to tie the end of the cord with a string and wrap a strip of cloth around the calf's body. A mild solution of creolin, zenoleum or carbolic acid should be applied to the cord as a disinfectant.

Scours from Indigestion.—Calves should not be allowed to have indigestion as it gives them a set back from which they recover slowly and may cause undersized animals, and even bad digestion when they are grown. By watching each individual closely this trouble can be controlled. The point is to detect the disease before it has made any

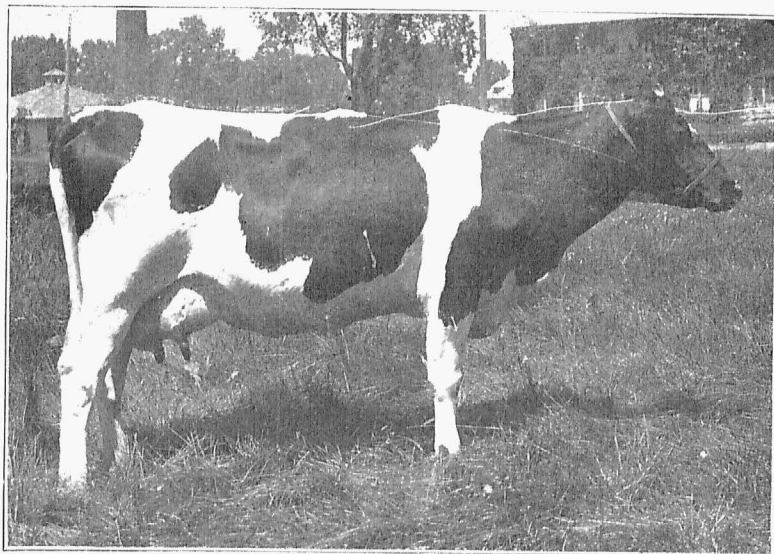
marked progress. This may be done by watching the droppings. In case scours are suspected cut down all feed immediately to one-half or less, and as the calf improves, gradually increase the feed to normal. Where a marked case occurs a drench of 3 ounces of castor oil in a pint of milk is good. Sometimes boiling the milk before feeding will check the trouble while some have used dried blood with success. One-half ounce of formalin in $15\frac{1}{2}$ ounces of water given at the rate of one teaspoonful for each pound of milk fed will destroy the germs causing fermentation in the digestive tract. This is given with best results at the first indication of scours and continuing until all signs have disappeared.



Skim-Milk Calves in Stanchions in the Pasture.
Calves should be tied when fed.

It is much easier to prevent scours than it is to cure them. In most cases all that is necessary is to observe the rules for feeding calves. By watching the small points and keeping the conditions right, success will take the place of failure. The essential points to be kept in mind are the following:

- Do not overfeed.
- Feed warm milk.
- Feed sweet, fresh milk.
- Feed each animal individually.
- Feed regularly.
- Keep the pails and quarters where the calves are kept clean.



PONTIAC GERBEN DEKOL.

A member of the College Dairy Herd. Third cow for her age in the Holstein-Friesian Breed in milk production. Official record as a four-year-old, 17,691 pounds of milk in one year.