

# Cattle Producer's Handbook

Management Section

786

## Artificial Rearing of Calves on Milk Replacer Diets

*Franz C. Rulofson, Livestock and Natural Resources Advisor,  
Tuolumne and Stanislaus Counties, University of California Cooperative Extension*

*Mike Gamroth, Extension Dairy Specialist, Oregon State University*

Calves are raised without their mothers for several reasons. Occasionally, a cow dies during or immediately after parturition, leaving an orphan calf to be raised. Also, sometimes a mother fails to give a sufficient quantity of milk for her newborn. Sometimes, multiple births occur.

Commercial dairies routinely raise heifer calves on milk replacer diets. In other cases, cattle producers purchase calves and raise them for sale or meat. These small animals are excellent for 4-H and FFA youth member projects.

### Where to Obtain Calves

Preference should be given to obtaining calves at the farm. However, this is not always possible. In some locations, dealers pick up calves at the farm and deliver them to calf raisers. These people, by experience, learn how to protect calves in transit. If this service is available in your area and you use it, patronize those who keep their trucks clean and demonstrate that they protect the calves.

Livestock auction barns are the easiest markets for both the buyer and the seller but may be the poorest as far as the calf is concerned. Expect calves from auction barns to have been exposed to every disease organism in the area. Too often, care at the originating farm for calves sold through livestock auction barns was poor. These calves often become sick and dehydrated at the sale barn.

### Adequate Facilities Are Important

Before purchasing a calf be sure you have adequate facilities to house and raise it. Calves should have individual housing. Individual pens are the best way of housing calves until they reach weaning age. The separate pens keep the calves from sucking one another

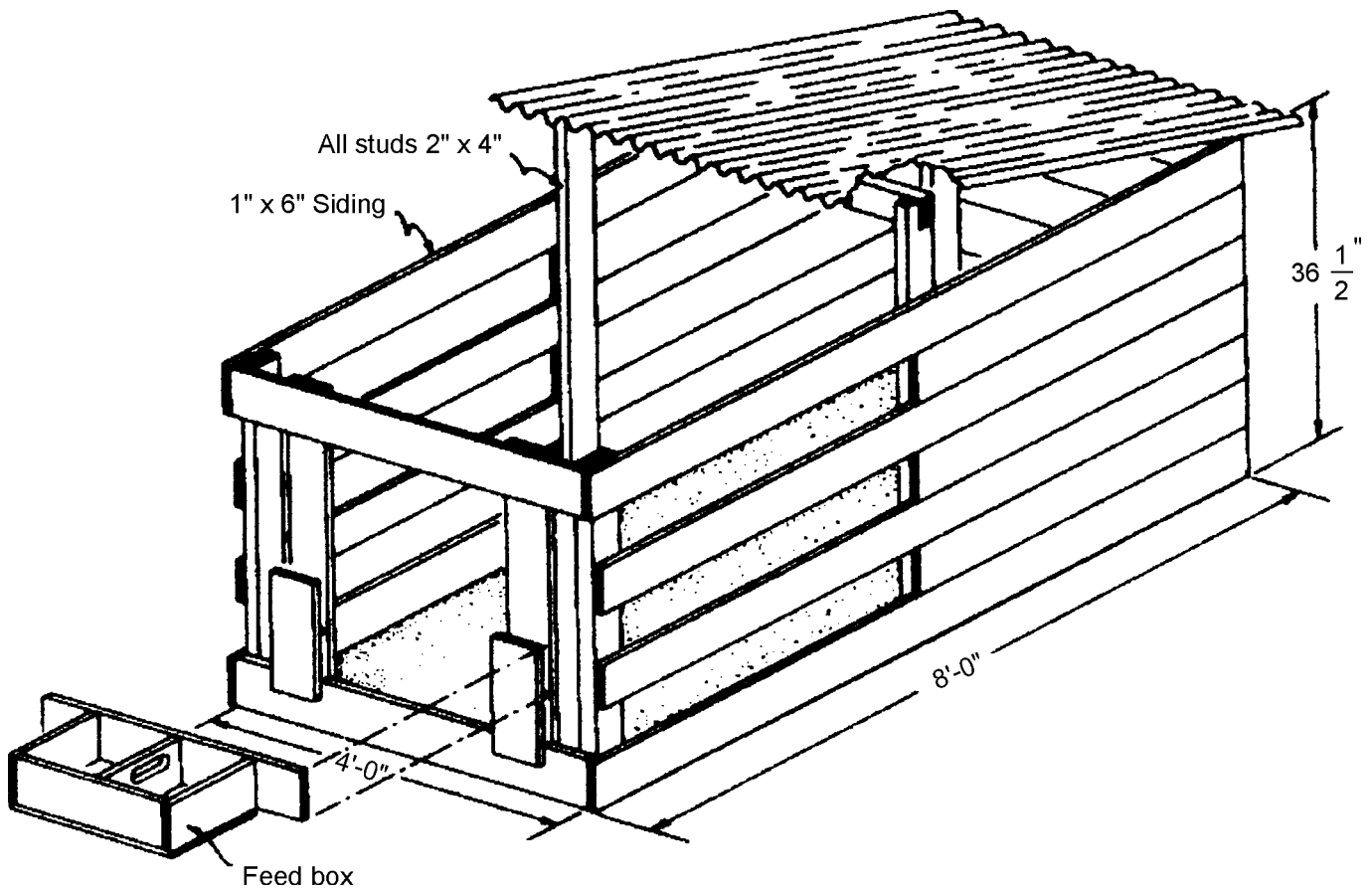
and reduce the spread of calf disease. They require 15 to 20 square feet of barn space if they have access to an outdoor lot. If they do not have access to an outdoor lot 20 to 30 square feet of barn space is required.

Calf pens must be clean and properly ventilated. If these two requirements are met, most facilities are acceptable. Preferably, cattle producers should arrange for barns or pens that can be emptied completely for brief periods before housing more calves. When a calf is removed, clean and sanitize the entire pen before housing another calf. The intent should be to return the pen to a sanitized condition.

Ventilation must be good enough that calves have plentiful supplies of fresh air at all times, but direct drafts must be avoided. Both points are critically important. The smell of ammonia or fecal odors indicates that more fresh air is needed. The ability to supply enough fresh air without creating drafts can be a challenge.

Outdoor calf pens (Fig. 1) must be partially covered and walled to protect the calf from excessive heat caused by the sun and to guard against cold winter weather conditions. Pens that open to the south absorb more heat than those set in any other direction. However, on the West Coast those pens facing southward would also take in too much rain. Those directed eastward would gain the warmth of the morning sun and provide shade during the warmer parts of the day. For more information on protective shelters for beef calves see 790.

Individual calf housing allows cattle producers the capability to accomplish most of the important considerations mentioned previously. It enables accurate appraisal of the calf's daily feed intake and an assessment of feces consistency, which is a primary indicator of the calf's health.



**Fig. 1. Calf hutch.** Source: J. L. Bumgarner (retired), principal drafting technician, Department of Agricultural Engineering, University of California, Davis.

## Feeding the Newborn Calf

The first and most important feed given a newborn calf is colostrum. Colostrum is the calf's primary source of nutrients. It also provides essential and irreplaceable antibodies (immunoglobulins) that help to maintain the animal's health and reduce mortality rates.

Within the first 24 hours of life, calves receive all the immunity they'll acquire for the next several weeks. They absorb most of the immunoglobulins in colostrum immediately after birth through the cells of their intestinal lining.

From birth to 6 hours, all the cells have the ability to absorb immunoglobulins. After 6 hours, the absorption rate declines significantly, and by 24 hours, most of the absorptive capacity of the cells is lost. For more information about feeding fresh or frozen colostrum see 644.

## Colostrum Supplements

Colostrum substitutes have been promoted for use in calves. These products are not adequate substitutes for cow colostrum. They are meant to be supplements for calves that have already received some natural colostrum.

Many products are on the market that are promoted for colostrum supplementation of the newborn calf. Remember these products are supplements—not substitutes.

## Feed Requirements

In addition to colostrum, calves need milk for the first 3 or 4 weeks of life. After that, they can digest vegetable starches and sugars. Further milk feeding is nutritious but may be more costly than cereal grains.

Cattle producers have a tendency to feed the baby calf too much and the older calf too little. Whole milk or milk replacer should be fed at a rate of 10 to 12 percent of the calf's body weight for the first 4 weeks.

Although the calf has a four-part stomach, it functions primarily as a monogastric (simple-stomached) animal during the first part of its life. In the young calf, liquids can bypass the first three compartments (rumen, reticulum, omasum) and flow directly to the abomasum, or true stomach, through a tube called the esophageal groove.

All liquids initially provided calves should be at room or body temperature to enhance closure of the esophageal groove, and should be transferred directly to the abomasum to promote early formation of curd.

## Milk Replacers

Newborn calves lack sufficient enzymes to efficiently utilize nondairy feedstuffs, such as grains, sugars, vegetables, forages, etc. Therefore, good milk replacers are

composed of sizable amounts of milk byproducts, such as skim milk, buttermilk, or whey; and they are generally reinforced with animal or vegetable fats, antibiotics, vitamins, and minerals. They can be fed as the only feed after colostrum feeding or used in conjunction with a calf starter.

Several different types of milk replacers are available. The choice between these should be based primarily on quality rather than price. Quality depends on the level and source of protein, fat, and carbohydrate. For most calves, 10 percent fat in the milk replacer is adequate.

The effect of higher fat levels is to discourage dry feed intake, and it is normally desirable to encourage early consumption of dry feed, which in turn allows the calf to be weaned at an earlier age. Milk replacers should contain at least 20 percent protein when the protein is from milk products. When soy protein is used extensively, the protein level should be higher (22 to 24 percent).

Milk replacers designed for calves older than 4 weeks of age should not be used for younger calves. The label directions on the replacer bag should be carefully followed. In addition, calves raised in cold environments grow better when fed replacers containing more fat (20%), as an energy source, during the winter months.

## Feeding Interval

Calves are fairly adaptable to a variety of management practices, however, successful calf feeding programs should be designed to be as consistent as possible on a daily basis. While calves are generally given two equal feedings per day, weak calves benefit from more frequent feeding. The proper amount to feed weak calves at each feeding is determined by dividing the total recommended daily amount by the number of daily feedings. Single daily feedings may increase the incidence of scours because of the high intake of total solids during a single short meal.

## Sanitize Feeding Equipment

Cattle producers should thoroughly clean any utensils used to feed calves. Milk residue, colostrum, or replacer is a great medium for the multiplication of bacteria, and the calf is a vulnerable host. Play it safe, and ensure minimum exposure by thoroughly cleaning and sanitizing all utensils used after each feeding. After use, equipment can be disinfected by disassembling and washing with hot soapy water, rinsing with hot water, dipping into a sanitizer solution, and drying before reassembly.

## Water Is Important

Make clean, fresh water available to the calf at all times. Water is necessary for calves even before they are weaned from milk. To prevent the calf from drinking too much water at one time and possibly causing scours, have the water in a different container and a different location from the milk feeding.

## Calf Starters

The first dry feed offered to calves is starter. Starter is a palatable, coarse-textured, or pelleted concentrate. It should contain 75 to 80 percent TDN and 15 to 20 percent crude protein.

Calf starters should be coarsely ground, rolled, or pelleted. If the starter is ground too finely, palatability and feed intake decrease. The primary purpose of the calf starter is to speed the transition of the calf's diet from an all-liquid feed to a solid feed. By providing a coarse feed, rumen development is facilitated.

Teach your calf to eat dry feed as soon as possible. Place a small amount in its mouth after each feeding of milk, or place a small amount in the feed box to encourage your calf to eat. About 1/2 pint or 1/4 pound of grain is all that a small calf will eat each day. Increase the amount gradually until your calf is eating about 2 or 3 pounds of starter at 3 months of age and about 3 to 5 pounds of starter at 6 months of age (depending on the breed and condition of calf).

Good calf starters (calf meal or pellets) contain adequate protein, vitamins, minerals, and antibiotics. You may purchase prepared calf starters from most feed dealers. Feed according to recommendations.

## Weaning

Calves can be weaned between 4 to 8 weeks of age. Weaning later than 8 weeks should be based on calves having adequate body condition. Weaning according to starter intake (1.5 to 2 pounds per day) is a good practice. In some cases, calves must be maintained longer on liquid feed because of low grain intake.

Weaning may be abrupt or gradual. Calves receiving larger amounts of liquid feed may be gradually weaned to reduce trauma. In general, early weaning reduces feed and labor costs.

## After Weaning

From weaning to 3 months, the level of calf starter fed to the growing calf can be gradually raised to 6 pounds. High quality hay should be available free choice, and the calf can start getting a limited exposure to silage, green chop, and pasture. Care should be taken up to 6 months of age to avoid feeding excessive levels of these high-moisture roughages as they can limit dry matter and nutrient intake, resulting in poor growth, scours, and "pot-bellied" calves. By 3 months of age, the rumen should be almost fully developed, and the calf starter can be replaced by traditional feeds.

## Monitor Calf Growth

Check weight gains to determine if calves are growing at the desired rate. Periodically checking weights and heights of calves also helps you evaluate your feeding program. Use a scale or tape to monitor calf weight gains.

Also observe body condition and skeletal growth. Over conditioned calves may be receiving too much feed, or the ration may be low in protein and minerals. Lack of condition indicates underfeeding or poor quality feed.

If you don't have access to scales for weighing your calf, a weighing tape will estimate its weight quite accurately. Possibly you can get one free from feed companies or borrow one from your local Cooperative Extension Office.

To estimate weight, place tape around the calf's body at heart girth or directly behind the front legs. Be sure the calf is standing squarely on its feet. Have the tape fit firm but not tight. Then read the weight directly from the tape.

As calves mature, grain allotments can be lowered or increased according to the desired rate of gain and the relative prices of grain or roughages.

## Maintain Calf Health

The period immediately after birth and the first days of life are the critical times for calves. Full attention to details during this time can reduce death losses and lower the incidence of disease. It is far better to prevent diseases and ailments than to try to correct them after they occur.

Always be on guard to keep diseases from getting started. Feed calves correctly. Provide clean surroundings. Regular use of a rectal thermometer is one of the best methods to detect health problems early. Normal body temperature is 101.5°F. Early detection is essential for effective treatment.

While a veterinarian's call may be equal to the value of a calf, professional advice and assistance should be used. The veterinarian will know the disease most prevalent in an area, vaccinations that are needed, and will prescribe proper care and usage of drugs, etc. He or she can give counsel by telephone, too, at a minimal cost. Calf raisers should seek a veterinarian's guidance before attempting any vaccinations or treatments.

## Calf Scours (Diarrhea)

The two general types of calf scours are common scours and infectious white scours. It is sometimes difficult to distinguish the infectious disease from scours caused by other factors, such as overfeeding, irregular feeding, use of unclean utensils, abrupt changes in feed, or exposure to drafts and cold, damp floors. With the

infectious type of scours, however, several calves are usually affected, and, some animals may die quickly. For information on the prevention and control of calves scours refer to 645.

## Costs Involved

During the first 2 months of age you will have expenditures for the calf, milk replacer, calf starter grain, alfalfa hay, veterinary care and medication, housing and feeding equipment, and bedding. These costs will range between \$150 and \$200 per calf depending on the calf's purchase price.

Cattle producers must realize that a lot is involved in raising calves. Besides the initial cost of the calf, producers have additional costs in feed and medication.

Costs vary. Consider a minimum of \$500 to raise a calf to breeding age. Add the value of the newborn calf, and you have an estimate of the costs involved.

## References

- Bulgin, M. S., et. al. 1992. Prevention of baby calf diseases. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL648.
- Hansen, D. E. 2001. Feeding colostrum to a calf. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL644.
- Hansen, D. E. 1996. Prevention of calf scours. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL645.
- Hansen, D. E. 1996. Calf Scours: Causes and Treatment. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL646.
- Lane, V. M., M. S. Bulgin, and B. C. Anderson. 1992. Treatment of sick calves. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL649.
- Loucks, B., and F. Edmiston. 1998. Protective shelters for beef calves. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL790.
- Olson, D. P., E. P. Duren, K. A. Bramwell, S. R. Henson, R. R. Panting, T. w. Ritter, and D. W. Sharp. 1996. Management of the neonatal beef calf. Cooperative Extension System, Cow-Calf Management Guide—Cattle Producer's Library 2<sup>nd</sup> Edition, CL785.
- Torell, R., B. Kvasnicka, and B. Bruce. 1997. Care of hypothermic (cold stressed) newborn beef calves. Cooperative Extension System, Cow-Calf Management Guide & Cattle Producer's Library 2<sup>nd</sup> Edition, CL788.



©2016

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, by the Cooperative Extension Systems at the University of Arizona, University of California, Colorado State University, University of Hawaii, University of Idaho, Montana State University, University of Nevada/Reno, New Mexico State University, Oregon State University, Utah State University, Washington State University and University of Wyoming, and the U.S. Department of Agriculture cooperating. The Cooperative Extension System provides equal opportunity in education and employment on the basis of race, color, religion, national origin, gender, age, disability, or status as a Vietnam-era veteran, as required by state and federal laws. Fourth edition; December 2016 Reprint