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Raising dairy calves

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**Cover picture courtesy of Guernsey Breeders' Journal**

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Raising Dairy Calves

BY W. RAY MURLEY, NORMAN L. JACOBSON AND JOHN B. HERRICK

CARE OF THE CALF STARTS BEFORE BIRTH

The first essential for raising a healthy calf is feeding the cow well during gestation. During heavy lactation the cow loses proteins, fats, vitamins and minerals. The cow needs 6-8 weeks dry period with good feed to rebuild these body stores.

Having access to good pasture, hay or silage solves most of the problems of feeding dry cows. If cows are in poor condition, or if the roughage is of poor quality, from 4 to 8 pounds of concentrates should be fed daily. The cows can be fed the same concentrate mixture used for the milking herd.

CARE OF THE COW AT CALVING TIME

1. Let the cow calve in a clean, well-bedded maternity stall.
2. In summer, a small shady pasture, separate from other livestock, is a suitable place.
3. Feed the cow less corn and more wheat bran.
4. Provide plenty of fresh, clean water for the cow.
5. Observe the cow closely so help can be given if needed.

The time of birth is a critical period for both the calf and the cow. Special care must be given them at that time. If the cow has difficulty in giving birth to the calf, examine her to see if delivery is normal. Front feet of the calf should appear first, then the nose. Any abnormality in presentation requires immediate attention to correct the position of the calf so that it can be delivered.

"Feeding Dairy Cows" Iowa Agricultural Experiment Station-Agricultural Extension Service Bulletin FS9, Ames, Iowa.
CARE OF THE CALF IMMEDIATELY AFTER BIRTH

Immediately after the calf is born make sure that all mucus is removed from the nose and mouth. If the calf does not start to breathe, artificial respiration should be used by alternately compressing and relaxing the chest walls with the hands.

In severe weather and when the cow fails to lick the calf,
rub it briskly with a sack to hasten drying and to increase the rate of blood circulation.

As soon after birth as possible disinfect the calf's navel with tincture of iodine to guard against infection. Wash the udder of the cow before the calf nurses, as a precaution against possible bacterial infection. Strong, well-developed calves will be on their feet and nursing within an hour after birth. Help weak calves to nurse within the first hour. This is a critical period when a good feeding of colostrum is needed to give calves a good start.

**FEEDING CALVES FROM BIRTH TO 6 MONTHS**

Probably the most critical period in the life of a calf is from birth to 6 months of age. There are several methods of feeding, and the principal ones are summarized in Table 1.

A common procedure for starting calves is to allow them to nurse for the first 3 or 4 days then change to pail feeding. Some dairymen find it easier to teach calves to drink from open or nipple pails if they never have nursed.

Feeding calves either from an open pail or from a nipple pail gives good results. The nipple pail has several advantages over open pails. The principal advantage is that calves are forced to drink more slowly, thus digestive upsets are less likely to develop.

**COLOSTRUM**

Colostrum, or first milk, is needed by the newborn calf because:

1. It contains substances, known as antibodies, which help the calf develop resistance to bacterial infection.
TABLE 1. PRINCIPAL SYSTEMS OF FEEDING DAIRY CALVES FROM BIRTH TO 6 MONTHS OF AGE.

<table>
<thead>
<tr>
<th>Feeds</th>
<th>Nurse cow method</th>
<th>Liberal milk feeding (whole and separated milk available)</th>
<th>Limited milk feeding (whole milk available)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age (days)</td>
<td>Amount daily per calf</td>
<td>Age (days)</td>
</tr>
<tr>
<td>Colostrum</td>
<td>0—3</td>
<td>Free choice</td>
<td>0—3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6—10 lbs.*</td>
<td>0—3</td>
</tr>
<tr>
<td>Whole milk</td>
<td>4—120</td>
<td>Free choice</td>
<td>4—28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6—12 lbs.*</td>
<td>4—42</td>
</tr>
<tr>
<td>Separated milk</td>
<td>—</td>
<td>None</td>
<td>29—120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10—16 lbs.*</td>
<td>—</td>
</tr>
<tr>
<td>Calf starter</td>
<td>—</td>
<td>None</td>
<td>14—120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free choice (up to 4 lbs.)</td>
<td>Free choice (up to 4 lbs.)</td>
</tr>
<tr>
<td>Concentrate mixture**</td>
<td>14—180</td>
<td>Free choice (up to 4 lbs.)</td>
<td>14—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free choice (up to 4 lbs.)</td>
<td>121—180</td>
</tr>
<tr>
<td>Hay</td>
<td>14—180</td>
<td>Free choice</td>
<td>14—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free choice</td>
<td>12—180</td>
</tr>
<tr>
<td>Silage (optional)</td>
<td>120—180</td>
<td>2—8 pounds</td>
<td>120—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2—8 lbs.</td>
<td>2—8 lbs.</td>
</tr>
<tr>
<td>Pasture (optional)</td>
<td>120—180</td>
<td>Limited</td>
<td>120—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited</td>
<td>120—180</td>
</tr>
<tr>
<td>Water</td>
<td>42—180</td>
<td>Free choice</td>
<td>42—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free choice</td>
<td>21—180</td>
</tr>
<tr>
<td>Salt</td>
<td>14—180</td>
<td>Free choice</td>
<td>14—180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free choice</td>
<td>14—180</td>
</tr>
</tbody>
</table>

*The amount of colostrum or milk fed daily should not exceed 1 pound for each 10 pounds of the weight of the calf.

**Suggested mixture: Cracked corn—3 parts; crushed oats—3 parts; wheat bran—3 parts; soybean, cottonseed or linseed oil meal—1 part. (Also may include 2 percent steamed bone meal and 1 percent salt.)
2. It is high in proteins and vitamins, especially vitamin A.

3. It is slightly laxative and thus aids digestion.

Frequently more colostrum is produced than the newborn calf can consume. Excess colostrum should be fed to older calves because of its high nutritive value and because it can replace whole milk in the ration. It can be fed safely if it is diluted with warm water in the proportion of two parts colostrum and one part water. Best results will be obtained if the colostrum is fed soon after it is produced. It may be stored for later feeding, however, if it is kept cold and stored under sanitary conditions. Usually it is safe to feed
colostrum after it has been stored for 2 or 3 days, providing it hasn’t soured and is warmed to approximately 100° F. before feeding. If held longer, it should be kept frozen.

PRINCIPAL SYSTEMS OF MILK FEEDING

Nurse-cow Method

Good calves can be raised by the nurse-cow method. This method may be more costly than other means of raising calves. However, it is commonly used for raising veal calves and sometimes by purebred breeders in raising valuable calves.

With the nurse-cow method, there will be less danger of digestive disturbance and bacterial infection. Also less labor is involved.

Liberal Milk Method

Maximum growth can be obtained when liberal amounts of whole milk and separated milk are fed. Whole milk should be fed for 3 or 4 weeks. Then it may be replaced gradually by separated milk. Dried skimmilk or dried buttermilk may
be used. To reconstitute the dried milk, add 1 pound of powder to 9 pounds of water. Feed at the rate shown in table 1.

Calf losses usually are greatest during the early milk feeding stage. Digestive upsets and bacterial infection are the main causes. Most of these difficulties may be prevented by following a few simple precautions:

1. Avoid over-feeding. (See table 1.)
2. Feed only warm (90° to 100°F.) milk.
3. Feed only fresh milk.
4. Feed the calves at regular hours each day.
5. Use only pails that have been scrubbed thoroughly after each usage.
6. Reduce the feed intake if scouring is observed.

**Limited Milk Method**

Calf feeding is difficult on farms where whole milk is sold. Whole milk is a relatively costly feed and separated milk usually is unavailable. If a limited amount of milk is to be fed, start the calves on whole milk. Supplement with calf starter at about 1 week of age. Calf starter, or meal, usually is a rather complex concentrate mixture designed to be highly palatable and contains an ample quantity of high quality protein. Good commercial calf starter will contain not less than 20 percent protein and no more than 6 percent crude fiber. Because of its relatively high cost, the starter should be replaced when the calves are about 4 months of age with a more simple, less expensive concentrate mixture.

Calf meal pellets seem to have no advantage except to make uniform consumption certain when there is a tendency
for some of the ingredients to separate out. Feeding gruel instead of meal has no advantage. Gruel produces no better growth than dry concentrate and the time and labor involved are greater.

**Concentrates**

The concentrate mixture fed to young calves can be extremely simple (table 1), when good quality roughage is included in the ration. Calves should be encouraged to eat the concentrate mixture as early as possible. One way to do this is to place a little of the concentrate mix in the pail from which the calves have consumed the milk. After the calves once get the taste of the mixture, they will eat it more readily in dry form. Grains which are whole, cracked or crushed are more palatable to calves than those which are finely ground. The feed box should be cleaned daily and filled with a fresh supply of the concentrate mixture.

![Fig. 6. Calves will eat a concentrate mixture at about 2 weeks of age if it is available.](http://lib.dr.iastate.edu/bulletinp/vol4/iss106/1)
Roughages

Early cut, mixed legume-and-grass hay which is well-cured, green in color, and free from mold is an ideal roughage for young calves. Offer it free-choice to calves as soon as they will eat it. Calves usually will start eating hay at about 2 weeks of age, and will eat more if it is kept before them at all times. Fresh hay should be supplied frequently.

Silage may be fed to calves in limited amounts after they are 4 months of age. Silage is quite bulky for young calves, therefore, the rate of feeding should be about 2 pounds per day at 4 months of age. Gradually increase the amount fed as the calf gets older until the calf is receiving not more than 8 pounds per day at 6 months of age. Feed only good quality, mold-free silage. Legume and grass silages usually are a good source of carotene (the material from which vitamin A is made) while corn silage is a fair source.

Fig. 7. Keep them growing with high quality hay.
Fig. 8. Pasture is an excellent feed for older calves.

Pasture is an excellent feed but is bulky. Calves, because of their limited digestive capacity, are unable to consume enough grass to furnish more than a small portion of their requirements until they are about 6 months of age. The main benefits of pasture to calves under 4 months of age are exercise, sunshine and fresh air. A dry lot will do as well. Calves between 4 and 6 months of age should have a concentrate mixture and hay in addition to pasture. Calves on pasture should have fresh, clean water, shade and shelter.

FEEDING HEIFERS FROM 6 MONTHS OF AGE TO CALVING TIME

The first 6 months is the most critical period of a heifer's life. After that time the job of raising her is comparatively easy. Heifers should receive grain in addition to hay or pasture until they are about 10 to 12 months of age. It is never economical to underfeed heifers. Keep them growing by adjusting the amount of concentrates fed and by supplying an abundance of roughage. With good roughage, 2 to 3
pounds of concentrates per head daily should be sufficient. When poor quality roughage is fed, 4 to 5 pounds of concentrate may be needed. Heifers 6 to 12 months of age should be fed 8 to 15 pounds of hay a day, or 5 to 10 pounds of hay and 8 to 15 pounds of silage.

TABLE 2. SUGGESTED CONCENTRATE MIXTURES FOR HEIFERS OVER 6 MONTHS OF AGE.

a. To feed with high-protein roughages. (When \( \frac{1}{2} \) or more of the roughage comes from legume hay, legume pasture or legume silage.)

Total protein .................................................. 12-14 percent
Digestible protein ........................................ 9-11 percent

<table>
<thead>
<tr>
<th></th>
<th>Mixture 1</th>
<th>Mixture 2</th>
<th>Mixture 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn and cob meal</td>
<td>(lbs.)</td>
<td>(lbs.)</td>
<td>(lbs.)</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Ground oats</td>
<td>300</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>...</td>
<td>...</td>
<td>100</td>
</tr>
<tr>
<td>High-protein feed*</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

b. To feed with low-protein roughages. (When less than \( \frac{1}{2} \) of the roughage comes from legume hay, legume pasture or legume silage.)

Total protein .................................................. 16-18 percent
Digestible protein ........................................ 12-14 percent

<table>
<thead>
<tr>
<th></th>
<th>Mixture 1</th>
<th>Mixture 2</th>
<th>Mixture 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn and cob meal</td>
<td>(lbs.)</td>
<td>(lbs.)</td>
<td>(lbs.)</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Ground oats</td>
<td>300</td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>...</td>
<td>...</td>
<td>200</td>
</tr>
<tr>
<td>High-protein feed*</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

*May be cracked soybeans, soybean oilmeal, linseed oilmeal or cottonseed meal.
A concentrate mixture containing 12 to 14 percent total protein is satisfactory when at least half of the roughage consumed is a legume, either as hay, pasture or silage. With little or no legume roughage, the concentrate mixture should have 16 to 18 percent protein. (See table 2.)

**MINERALS**

Mineral supplements, other than salt, seldom are necessary if the calf is fed a ration containing liberal amounts of milk, concentrates and legume hay. Feed steamed bone meal in addition to salt if the quality of roughage is poor, or if concentrate feeding or milk feeding is limited. Minerals may be self-fed or mixed with the concentrates at the rate of 2 percent steamed bone meal and 1 percent salt.

Occasionally other mineral deficiencies in calves occur in areas where some of the minerals in the soil are low. They include such minerals as cobalt, manganese, iron, copper and iodine.

**VITAMINS**

The young calf rarely requires supplemental vitamins except vitamins A and D. Deficiencies of these vitamins are
more likely to occur during winter and spring than during summer and fall.

The best natural source of vitamin A, or carotene, for young calves is colostrum. This is especially true if the cow has had access to good pasture or good hay. As the calves get older, green, leafy roughages are an excellent source of carotene.

The symptoms of vitamin A deficiency include nasal discharge, watery eyes, scours, poor growth and general unthriftiness.

If the natural source of vitamin A is poor, additional amounts must be added to the rations. The most common form in which vitamin A can be purchased commercially is fish liver oil concentrate. This can be fed either in capsules or with a teaspoon. The amount to feed will depend upon the concentration of vitamin A in the oil. Calves should receive about 15,000 International Units (or USP units) of vitamin A daily for the first month of age. After this, calves usually are eating enough roughage to supply sufficient vitamin A.

Symptoms of vitamin D deficiency include swelling and stiffness of the joints, bending of the forelegs, and a humped back. Vitamin D requirements usually can be met by exposing the calves to sunlight for a short period each day. Good quality sun-cured hay contains vitamin D. During adverse winter weather it may be necessary to feed additional vitamin D. Commercial sources of vitamin

Fig. 10. Vitamins A and D are necessary for proper growth.
D are fish liver oils and irradiated products. Supplement rations during winter with about 300 International Units (or USP units) of vitamin D per 100 pounds body weight daily.

**WATER**

Water can be given to calves of any age. However, when liberal quantities of whole or separated milk are fed there seems to be little advantage in watering before they reach 6 weeks of age except during extremely warm weather.

**GENERAL MANAGEMENT PROBLEMS**

**HOUSING**

Young calves need protection from severe weather. Individual pens or stalls that are well-bedded, dry, free from drafts and located in a well-ventilated barn are ideal for young calves. As they get older, calves may be placed in larger pens with other calves. Stanchions along one side of the pen should be used at feeding time to prevent calves from sucking each other. The practice of feeding grain just after the milk has been fed and while the calves are still in the stanchion will aid materially in preventing sucking.

Fig. 11. Keep them growing with plenty of clean, fresh water.
Allow calves freedom and exercise. Give calves of all ages access to fresh air and sunshine when weather conditions permit.

**SANITATION**

Digestive disorders are one of the common calf ailments and can be controlled largely by following a strict sanitation program. Scrub milk utensils with hot water and a wetting agent after each use. Rinse utensils in hot water or a chemical sterilizing solution just before use. It often is practical to use the same solution that was used for sterilizing the milking utensils.

Keep calf pens clean and dry, and brush out and clean feed boxes daily.

Isolate sick calves. Pens which sick calves have occupied should be thoroughly cleaned before using for other calves.

**DEHORNING**

Dehorn calves when 1 to 2 weeks old. This can be done by applying caustic potash or commercial preparations to the horn button. Clip the hair from an area around the
horn button and apply the preparation to the button. A little grease or ointment around the clipped area will prevent getting the preparation on the skin of the calf. Calves should not be turned out in the rain or put with other calves until a few hours after treatment.

Other methods of dehorning depend upon the animal’s age. Clippers or a “spoon” type clipper may be used on calves 2 to 10 months of age. Use a saw on older animals.

**REMOVAL OF EXTRA TEATS**

Frequently dairy calves have extra teats in addition to the four normal ones. These teats may not be particularly harmful but they have no value and detract from the appearance of the udder. Extra teats may be removed when the calf is about a month old and should be removed before the calf is a year old.

Probably the best and safest method of removing extra teats is to cut them off close to the udder with a clean, sharp pair of scissors. Disinfect the area around the teat with iodine before and after the operation. Usually there will be little bleeding. How-

---

Fig. 13. Clip around horn button. Apply caustic to horn button.

Fig. 14. Remove extra teats.
ever, if bleeding is consider-
able, a cotton pack held in
place a few minutes will be
sufficient treatment.

IDENTIFICATION

Mark all calves properly
for identification. Marking is
necessary in purebred herds
and is desirable in all herds
of considerable size. Animals
that are to be registered
must be sketched, photo-
graphed or tattooed accord-
ing to the regulations of the
breed association. Some of
the more common methods
of identification used for
calves are eartags, leather
straps or chains around the
necks of the calves, or tat-
toos in the ears.

VEAL CALVES

The profit from raising a
calf for veal depends upon
the price of veal, the value
of milk and the birth weight
of the calf. Each pound of
gain in weight requires
about 10 pounds of milk.
Highest prices are obtained
for veal at 150 to 200 pounds liveweight. A 70-pound calf
would need to gain 80 pounds to reach the minimum weight
which ordinarily brings the best price. This gain would
require about 800 pounds of milk. Thus the economy of
veal production in any particular situation can be deter-
mined by considering the above factors.
DAIRY CALF DISEASES

Common diseases of dairy calves are more effectively prevented than cured. Nutrition and general management are closely associated with them. Remember the importance of these factors when attempting to control the more common ailments of the young calf.

The diseases of dairy calves may be divided into three groups as to the age of the calf when affected:

1. From birth to 1 month of age.
2. From 1 month to 4 months of age.
3. From 4 months to 1 year of age.

CALF DISEASES FROM BIRTH TO 1 MONTH OF AGE

The greatest loss of calves occurs between birth and 1 month of age. During this period great emphasis should be placed on proper feeding and management.

White Scours

White scours are indicated by diarrhea with light-colored, watery feces. Scouring calves will appear to be exhausted. This disease may appear in the epidemic form and may occur as the result of a combination of nutritional deficiencies, bacterial invasion and faulty feeding practices. If white scours last more than a week, pneumonia usually develops. Calves over 20-25 days of age usually do not contract this disease.

Certain of the sulfa drugs have been helpful in combating white scours. They should not be used as a prophylactic and should be administered under the directions of a veterinarian. Continuous administration of these drugs even in small amounts causes kidney changes that are harmful. They also may produce sulfa-resistant bacteria that will not be inhibited by these drugs when given at a later time. Overdosage may be fatal. Sulfa drugs in high concentrations are very toxic and the dosage and type of drug used should be watched very carefully.
Blood transfusions from the dam at the time of birth are helpful in controlling white scours. Specific serums also have been used with satisfactory results. Mixed bacterins are of doubtful value in the control of white scours.

Deficiency of vitamin A and many of the intestinal infections of the newborn calf go hand-in-hand. Often the vitamin A deficiency of the calf is due to a vitamin A deficiency of the cow. Consequently, bacterial invasion is more likely because of the lowered resistance of the newborn calf.

Intra-uterine Infections

Calves may contract an infection of the umbilicus or navel at the time of birth. This often is noticed in herds where sterility and breeding difficulties are found. The possibility of infection in the reproductive organs of the pregnant cow must not be overlooked when attempting to solve the problems of calf losses.

Calf Diseases at 1 to 4 Months

Coccidiosis

One of the most destructive diseases of the calf during the second month of life is coccidiosis. Normally, older animals rather than calves harbor coccidia in the digestive tract. But if newborn calves are housed in filthy pens they may become infected and symptoms will appear within 30-35 days after birth. The common symptoms of coccidiosis are bloody diarrhea, loss of flesh and a constant straining. The disease is diagnosed by a fecal examination. Treatment usually is futile after the bloody diarrhea stage.

Colds—Pneumonia

Although colds and pneumonia may attack the calf in the first few weeks of life, the highest mortality from these ailments occurs after the first month. The usual symptoms of pneumonia are hard breathing, fever, loss of appetite and
coughing. Colds accompanied by a cough should be treated immediately. Adequate housing and sanitation will prevent these colds from developing into pneumonia. Several organisms are involved in calf pneumonia and the specific treatment depends on the type of organism present. Sulfadiazine, penicillin, and specific serums are used for treatment. It is preferable to administer the sulfadiazine intravenously in acute cases.

**CALF DISEASES AT 4 MONTHS TO 1 YEAR**

Calf diseases occurring from 4 months to 1 year of age are rather common and serious in individual cases.

**Ringworm**

Ringworm is a contagious skin disease caused by a fungus. It lives in the hair follicles and causes patches of the hair to fall out. Separate the infected animals from the healthy ones. Paint the affected area with 1 part salicylic acid to 10 parts of alcohol.

**Lice**

Lice are blood-sucking parasites. They generally are found on the head and neck. If calves are observed rubbing or scratching, they may be harboring these insects. Powders containing rotenone are recommended for control. DDT and benzene hexachloride are effective in the control of cattle lice but are dangerous if improperly applied.

**Warts**

Warts appear on the skin in various parts of the body, but most frequently are found in the region of lips and eyes. Wart vaccine may prove successful as a treatment.

**Blackleg**

This is an acute general infection of cattle characterized by swellings in the muscles, especially in the rear quarters. Young cattle from 4 months to 2 years of age suffer chiefly.
The symptoms are usually lameness with or without fever. The use of blackleg bacterin will usually confer permanent protection on calves of susceptible age.

**Hemorrhagic Septicemia**

Hemorrhagic septicemia, pasteurellosis or “shipping fever” produces an acute general infection characterized by sudden onset, high fever, diarrhea and hemorrhages of the internal organs. If it persists for a few days, severe nasal discharges will be observed. As a rule the infection is introduced by animals that have recently been shipped. Bacterins have been found to be of value as a prevention if administered 10 days to 2 weeks prior to infection. Treatment has been successful with specific serums, sulfa drugs and penicillin.