

DAIRY PROJECTS

FOR

4-H CLUB MEMBERS

Circular
420



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General Rules for the Beginner

- Start with a good heifer of a dairy breed.
- Make friends with your calf. Do not teach it to butt or kick.
- Put a halter on your calf the first week and keep it on. Lead it by the halter every day.
- Brush your calf and keep it clean. Keep the stall clean, dry, and well bedded.
- Clean the milk-feeding bucket after each feeding. Clean the grain bucket or box once or twice each week.
- Always feed your calf warm milk. Never feed it cool or cold milk.
- Begin feeding hay when the calf is 2 weeks old.
- Begin feeding grain when the calf is 3 weeks old.
- Keep drinking water and coarse salt in the stall all the time.
- Give your calf plenty of exercise.
- Don't turn your young calf out to pasture during cold, wet weather. Keep her in her stall.
- Don't let your calf run with the cows or work stock.
- Never let your calf suck other heifers, and never let other calves suck your heifer.
- Keep a record of feed and other expenses, and of the number of hours worked in this project.
- Attend and take part in club meetings, dairy meetings, and shows.

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Dairy Projects for 4-H Club Members

By G. J. MCKENNEY and BOYD E. WHEELER

EXPERIENCED DAIRY-PROJECT MEMBERS often buy a bred heifer or a cow in milk, and do well on the investment, but most members not over 12 years old should start this project with a heifer calf and grow into the production project with the calf. Dairymen have learned that heifer calves need good care and feed if they are to become well-grown, heavy-producing cows.

GET STALL AND EQUIPMENT READY

Prepare a good home for the calf beforehand—a clean dry place with plenty of light and 3 or 4 inches of straw or other suitable bedding. See that there is a hayrack in the stall that the calf can reach. Use a feed box that can be taken out of the stall after each feeding. Put a water container in one corner of the stall and nail boards across the corner to hold the container in place and keep the calf from fouling the water. Keep the container well filled with clean water. Use a 3-gallon bucket for feeding milk to the calf after it has been taken away from the cow.

A halter and a blanket will be needed. Either get a strap halter which can be adjusted to fit the calf as it grows older, or make a rope halter for it. Put the halter on the calf when it is a few days old, and lead it by the halter every day from then on.

When the calf is several weeks old and is used to handling, make or buy a blanket for it.¹

¹ For a small calf a very satisfactory blanket can be made from an old grain or feed sack. Rip the sack down one side and across the bottom. Tie the calf to a post or ring while you are fitting the blanket. Lay the material lengthwise along the back of the calf. The blanket should reach from just behind the tail setting to a place on the neck just beyond the shoulders, and below the shoulders and flanks on each side. If burlap is used, a double layer is better than one thickness because it keeps the calf cleaner and the hair in better show condition.

Sew 2 straps to the front end of the blanket, one on each side about 12 inches above the front corners, to tie under the neck. Sew another pair of straps, one on each side 12 to 15 inches behind the front corners, to tie under the body just behind the front legs. Sew a long strap on one side and a short one on the other, about 12 to 15 inches in front of the rear corners. Before sewing the straps on, pin them in place and try the blanket on your calf to be sure the straps make the blanket fit snugly, not too loose nor too tight. Then sew the straps on either the outside or underside of the blanket. Use heavy thread and sew 8 or 10 inches of each strap to the blanket. Get the most capable person in your family to help with fitting and sewing. Try the different straps for length before cutting them off.

SELECTING A HEIFER

Choice of a breed.— For "efficiency in production" there is little or no difference between the breeds of dairy cattle. Generally, the breed you like best is a good one to have.

Registered or grade.— A registration certificate shows that the animal is registered in a breed association, and that its sire and dam were registered animals of the same breed. A good registered cow is more likely to have good offspring than a grade cow which might be just as high-producing as the registered cow. Registered animals therefore generally sell for higher prices than grades. Since the first heifer owned may be the foundation for the future herd, it is usually best to have a registered heifer.

Age of heifer to get.— Start with a baby calf if you are not over 12 years old. If you are older, start with either a calf or an older animal.

However, if you buy a dairy animal, it usually is best to buy a heifer between 6 and 12 months old. A younger calf may develop faults in type later that make her undesirable. If she is older than 12 months, there is more danger of getting one which has recently become infected with Bang's disease. On the other hand, a heifer 18 to 24 months old gives the best indication of her future development, and you have to wait but a short time before you get a return on the investment. The amount of money and feed available should be considered also. It is always better to buy a good calf than a common yearling.

Pedigree.— The points of importance in the pedigree are:

Records of milk and butterfat of half sisters and full sisters.

Milk and butterfat records of the dam.

Milk and butterfat records of the sisters to the sire and dam.

Milk and butterfat records of the grand-dams.

What is the classification of the close ancestors (Excellent, Very Good, etc.)?

Qualities of a good heifer.— In selecting a dairy calf look for the following traits:

Head erect, refined, feminine.

Eye large, alert, prominent, placid.

Neck long, straight, refined.

Withers refined, not coarse, thick, or open.

Back straight, strong.

Body long, deep, and wide.

Rump long, level, and wide, with level tail setting.

Thighs wide apart, thin, and incurving.

Legs well placed, fine-boned, straight.

Large for her age.

Color and type characteristic of the breed.

CARE OF CALF UNTIL 6 MONTHS OLD

If you are expecting to use a calf produced on the home farm you will do well to make friends with the cow before the calf is born, or "dropped" as dairymen say. You should feed and care for the cow before she calves. This will make the cow easier to work with after she calves. As soon as possible after your calf is born, put iodine on its navel to avoid infection.

Let the baby calf nurse its mother (its "dam") for the first 3 days after it is born. This allows it to get the first milk (colostrum), which is very necessary to the health of the calf.

On the 4th day keep the calf away from its mother and teach it to drink milk from a bucket. At feeding time get it, if you can, to drink about half a gallon of fresh, warm milk. Use a clean bucket and keep the bucket clean. Wash it after every feeding.

To teach the calf to drink, straddle its neck, back it into a corner, dip one hand into the milk, and let the calf suck the milk on your fingers. Then push the calf's head down gently but firmly into the bucket. Let it suck the milk up between your fingers. While it is drinking draw your fingers from its mouth. Do this at each feeding until the calf learns to get along without your fingers.

If the calf doesn't take much of the milk the first time, don't let it suck the cow again. Let it go hungry until next feeding time.

If the milk gets cool while you are trying to teach the calf to drink, warm it until it is as warm as milk fresh from the cow. Don't feed your calf cold milk! Remember that if your hands are cold, cool milk will feel warm to them!

Keep the calf alone in the stall or in a separate lot. Don't let it run in the pasture with the cows.

How Much to Feed a Calf

Milk.— Don't give the calf too much milk. It needs only 1 pound for each 10 pounds it weighs. (1 pint = 1 pound.) A 60-pound calf should have 3 pounds of whole milk at each feeding, two feedings a day. An 80-pound calf would need 4 pounds at each feeding, twice a day; and a 90-pound calf $4\frac{1}{2}$ pounds twice a day. When the calf is 4 weeks old begin to change gradually to skim milk (if you have it) by substituting 1 pound of skim milk for a pound of whole milk the first and second days, 2 pounds the third and fourth days, and skim milk only by the fifth day. Then increase the amount fed by 1 pound every 10 days until the calf is getting 15 to 20 pounds a day.

Continue feeding milk until the calf is at least 6 months old. Most calves in Kentucky don't get enough milk during their first 6 months. Many of them get too much during the first few weeks, and too little when they are 3 to 6 months old.

If you don't have skimmilk, feed whole milk until the calf is 6 months old, feeding 1 pint of milk for each 10 pounds the calf weighs, or use one of the commercial calf meals or calf starters according to the directions of the manufacturer. If there are no directions with the calf meal or starter use this schedule: When the calf is 2 weeks old start giving it a handful of the starter at each feeding. Don't cut down on the whole milk during this time. When the calf is 4 weeks old, if it is eating the starter well, add a pint of warm water to the milk the first day, 2 pints the second day, and so on until the calf is getting no milk. Then give the calf all the starter it will eat twice a day until it is getting 5 to 6 pounds of dry grain feed each day by the time it is 6 months old. Don't feed more starter than the calf will clean up. Keep the feed box clean.

Grain with skimmilk.— Begin feeding a little calf meal, or a mixture of 2 parts ground corn and 1 part bran, when the calf is 2 weeks old. Don't feed more than the calf will clean up.

When you begin feeding grain, don't feed any until the calf has had milk. At first your calf may not pay any attention to the grain. If this happens, rub some coarse-ground grain on the calf's wet mouth and let it get used to the taste by licking it off, or put a handful into the calf's milk bucket with a little milk to moisten it. After a while the calf will smell or muzzle the feed bucket and soon will be eating.

The amounts and kinds of grain needed by calves of different ages and of different breeds, with little or no pasture, are shown in the following table:

AGE OF CALF	GRAIN MIXTURE BY WEIGHT	AMOUNT DAILY
2 to 3 weeks (with whole milk)	2 parts corn 1 part bran	½ pound, if eaten
3 weeks to 3 months (with skimmilk)	2 parts corn 1 part bran	1 pound, if eaten
3 to 6 months (with skimmilk)	2 parts corn 1 part bran	Jersey or Guernsey, 1 to 2 pounds Holstein or Brown Swiss, 2 to 3 pounds
6 to 8 months (no milk)	4 parts corn 2 parts bran 1 part oilmeal	Jersey or Guernsey, 5 to 6 pounds Holstein or Brown Swiss, 6 to 8 pounds

When the calf is eating grain readily, start weighing the feed and follow the feeding table carefully. Weigh a quart can or other small measure that holds at least a pound of the feed. Mark the can or measure at the place for a half pound of feed and also at the pound level. It will then be easy to feed a half pound or as many pounds as the table calls for.

A good calf meal, if it is used instead of the corn-bran mixture, should contain cornmeal (preferably from yellow corn), ground oats, wheat bran, linseed oilmeal or soybean oilmeal, steamed bonemeal, fine-ground limestone, and salt. Some calf feeds also contain soluble blood flour. If you buy commercial feed, study the tag to see what the feed is made of—and don't waste your money on feed that has a yellow tag.

Some calves need more grain than others to keep them growing and in good flesh, but don't get your calf too fat. Dairy calves need to grow, but not to fatten like beef calves.

Some calves stop taking milk before they are 6 months old. If this happens, add about half a pound more grain at each feeding if the calf will eat it all. Don't feed more grain than the calf will eat.

If your calf's hair is bright and shiny and it is strong and playful you and your calf are doing a good job.

Hay.— Put a little clean, bright, leafy hay in the rack the first week and keep fresh hay in the rack at all times as long as the calf stays in the stall. Put fresh hay in the rack at least once each day.

Legume hay, such as good leafy alfalfa, clover, or lespedeza, is best for young, growing calves. At first, however, the hay is less likely to cause scours if it has some grass in it.

Each morning, remove the droppings and wet bedding from the stall and replace with dry bedding. Any stemmy, coarse part of the hay left in the rack can be used for bedding.

Salt.— Salt is very necessary to the calf. If salt is not in your calf meal, get your calf used to eating it by placing a level tablespoonful in a box. Do this about twice each week until it leaves some salt in the box. Then it will be safe to keep coarse salt in the box all the time. Don't put salt on the ground. Feed it in a box.

Silage.— Until your calf is 3 months old, don't feed silage. After it is 3 months old some may be fed—1 pound a day for the first few weeks and gradually more until the calf is getting 3 to 7 pounds a day when 6 to 8 months old.

Grass.— Until after the calf is 4 months old, don't let it have much grass. Turn the calf out for exercise and, of course, some grass, but give it a full feed before turning it out. Young, growing grass is best. Even after the calf is on pasture most of the time, however, it needs more feed than the pasture can furnish, so continue your milk and grain feeding until the calf is 6 months old.

Diseases and Insect Troubles

Scours.— Some baby calves have scours which may be caused by too much feed, a dirty bucket, cold milk, irregular feeding, or a filthy stall. If your baby calf scours, reduce the amount of feed for a day

or so. If the scours continue for several days, drench the calf with a mixture of 2 ounces of castor oil and 1 ounce of cod-liver oil. You can have the mixture made up at a drugstore or you can measure and mix it yourself. Two ounces of castor oil would be $5\frac{1}{3}$ tablespoonfuls, and one ounce of cod-liver oil would be $2\frac{2}{3}$ tablespoonfuls. Pour the castor oil into a soft-drink bottle, add the cod-liver oil, shake well, and drench your calf. If after two days the scouring continues, drench the calf again. This amount may be used when needed until your calf is 2 months old.

After the scours stop, begin increasing the feed slowly until you have the calf back on full feed after 3 or 4 days. Watch your calf for signs of further scouring. If it does not stop, see your veterinarian or your county agent.

Ringworm.— If you should notice a brownish scale or scab on your calf it very likely is ringworm. Often this occurs on the side of the face, near the eyes. The treatment is simple. First wash the scab to soften it. Then lift the scab with the point of a knife blade and paint the place with iodine. Treat with iodine daily until the trouble clears up. Two or three treatments should be enough. Disinfect the stall, hayrack, and feed box thoroughly with stock dip or other standard disinfectants to prevent further infection.

Lice.— Lice are especially common on cattle during the winter. If you brush your calf once or twice each week it will not be likely to have lice. But if it rubs much and its hair begins to look stiff and dry, look for lice. If you find any, don't delay treating the calf for them. Dust rotenone powder (the same as is used in the garden for bean beetles) on the affected parts, and repeat in 12 to 14 days.

Warts are unsightly and should be removed as soon as found. A long, hanging wart can be removed by tying a strong thread tightly around it, so as to shut off the blood circulating to the wart. Leave the string on until the wart drops off. If the wart does not come off, try soaking it with oil and keeping it soaked.

Bloat.— For ordinary cases of bloat give a drench of 2 to 6 ounces of mineral oil or $\frac{1}{4}$ ounce of formalin in 1 quart of water. If the bloating goes down, then give a calf under 6 months old a drench of $\frac{1}{4}$ pound of Epsom salt dissolved in water. If bloating does not stop after the first treatment of mineral oil or formalin, do not give the Epsom-salt drench but repeat the mineral oil or formalin drench not more than 1 hour later. Then after the bloating goes down, give the Epsom-salt drench. If you cannot give mineral oil or formalin, force a stick about as large around as a broomstick between the calf's jaws (crossways, like a bit) and tie it with a strong cord over the top of the head and behind the ears so as to hold the stick in place. Walk the calf uphill if possible, for at least an hour. It is best to leave the stick

tied in the calf's mouth until you are certain no further bloating will occur.

For a cow or grown heifer the dose of formalin for bloat is $\frac{1}{2}$ ounce in 1 quart of water, given as a drench. When bloating goes down give 1 pound of Epsom salt as a drench. Feed and graze lightly following bloat.

Blackleg is a very serious disease which may be found in all cattle regardless of breed. An epidemic of blackleg can kill an entire herd unless checked by vaccination. If you buy a dairy animal, be certain it is from a farm which has had no recent outbreak of blackleg. When you take the animal home, keep it in a vacant lot away from all other cattle for at least 3 weeks. Then if any disease, such as blackleg, appears in the new animal, it will be easier to keep it from spreading to other cattle on the farm. In case of blackleg, call a veterinarian at once. Keep diseased animals away from all others, and have all other young cattle vaccinated. If an animal gets blackleg there is no treatment to cure it. Vaccination of calves after they are 6 months old, however, will prevent it. Calves can be vaccinated for it before they are 6 months old, but they should then be vaccinated again after they are 6 months old.

CARE OF HEIFER 6 TO 12 MONTHS OLD

Weaning the Calf

When you start weaning the calf from milk, do it gradually. Give more grain to take the place of the milk the calf has been getting. The first day, feed 1 quart less milk at each feeding and add $\frac{1}{2}$ pound of grain at each feeding. The next day feed 2 quarts less milk than usual at each feeding and add 1 pound more grain than usual at each feeding. Reduce the milk still more the third day, and feed more grain, until at the end of 3 to 5 days, the calf is getting no milk and you are feeding 3 to 5 pounds more grain per day than before. If your calf's appetite fails, take out only 1 quart of milk each day and add $\frac{1}{2}$ pound of feed.

Gradual weaning of your calf is one of the most important jobs in the dairy project. If you have kept your calf coming along nicely, you should not upset it by a sudden change of feed. Too many good heifers are starved by being turned out to rustle for themselves as soon as they are weaned.

Hay

At weaning and afterward, feed your calf all the hay she will clean up each day. Good alfalfa, lespedeza, or clover hay not only saves grain but helps develop bone and muscle and the well-developed body so necessary to a good dairy cow.

Grain Feeding

If you wean your calf in the fall, continue grain feeding through the winter, along with hay and silage, if you have good-quality silage. Start with a little silage and gradually increase it until the calf is getting 5 or 6 pounds daily during the winter.

If you wean your heifer calf in the spring, don't turn her out to grass and quit feeding grain. Continue the grain and hay 3 or 4 weeks and then gradually reduce the grain $\frac{1}{2}$ pound daily until she is getting only 2 or 3 pounds of grain each day. As long as the grass is growing and tender, continue feeding 2 or 3 pounds of grain each day and all the hay the calf will eat. If your calf is on good lespedeza or clover pasture, you will not need to increase the grain until killing frost; then increase it gradually. If pasture fails, however, increase the grain to 4 to 5 pounds daily.

In fall and winter a good rule to follow in feeding a dairy calf 6 to 12 months old is to give her 1 to $1\frac{1}{2}$ pounds of a good grain mixture for each 100 pounds she weighs. If you have good leafy hay or good hay and silage, 1 pound of grain for each 100 pounds she weighs will be enough. If you have timothy or a mixed grass hay, she will need more grain. Watch your calf and if she begins to grow fat, give her less grain. Keep her in good condition, but not fat and lazy.

A good mixture for your calf from weaning until she is 12 months old is made of equal parts (by weight) of corn, oats, and bran. Coarse-crack the corn so that it is about the size of the bran particles, and it will be easier to mix the feed. Another good mixture is equal parts of corn, barley, and wheat, all coarse-cracked and mixed. To each 100 pounds of your feed mixture, add 2 pounds of bonemeal and 1 pound of coarse salt, and mix thoroughly. If you buy commercial feed, study the tag carefully to see what the feed is made of. Don't waste your money on yellow-tag feeds.

Some club members don't take enough care in weighing and mixing their grain feed. They depend on a measuring cup or bucket to measure the amounts of the different feeds, and of course not all feeds weigh the same per cup. So weigh separately each feed that goes into the mixture, and then mix the feeds thoroughly together.

In addition to the salt and bonemeal in the feed, it is good practice to keep salt and bonemeal in your calf's stall all the time. Keep them in separate boxes.

In grain feeding you can save time by using a cup or bucket which holds 2 or more pounds. Be sure to mark this cup or bucket at the 1-pound and 2-pound levels. Always know how much you are feeding. Guesswork seldom produces a good dairy animal. If you feed your calf in a stall or shed with other calves, see that she gets her share of the feed.

Pasture for Your Heifer

From the time your calf is 6 months old, pasture is the most important single feed for her. So start your pasture plan early enough. Talk with your father and your county agent about it, and then get ready. Get your pasture program started, if you can, about the time the calf is born, or before.¹ She will need very little pasture during her first 4 months, but from 6 months on you should have the best pasture ready for her.

A good pasture for young growing animals is young, growing grass or legumes. After grass has grown old and tough it has less protein and is less helpful to the calf.

If you have a small lot which you can use for a pasture, you can have young growing grasses or legumes practically the year round. Usually 1 to 1½ acres will be needed for 1 calf. If your growing heifer has enough fresh, growing pasture, she will need little or no commercial protein feed from the time she is 6 months old until 2 or 3 months before time for her to calve.

The following pasture plans are for 1 calf.

Pasture plan No. 1.— Sow ½ to 1 acre of small grain and ½ acre of crimson clover. Wheat, barley, balbo rye, or common rye may be used. Of these, balbo rye is most winter hardy and will produce the earliest pasture. Sow the small grain in late August or early September, at the rate of 2 bushels to the acre. This will furnish late fall pasture, some winter pasture (especially balbo rye), and spring pasture until about the first of April. When the small grain is seeded, or shortly afterwards, sow timothy and redtop on the small grain, 5 pounds of each per acre. Sow 15 pounds of lespedeza in the small grain the first of March or as soon after that as the soil begins to warm up. If late freezes kill the young lespedeza, disk the ground lightly and sow it again.

Sow the crimson clover in August or early September, at the rate of 30 to 40 pounds to the acre. Or sow 20 pounds of crimson clover and 10 pounds of timothy to the acre. The heavier the stand of crimson clover the less likely it is to freeze out during a hard winter. Use the crimson clover, or the crimson clover and timothy, for late spring pasture after the small grain and before the lespedeza is ready. Don't let your calf or any other livestock or chickens graze the crimson clover during fall and winter. Grazing or walking on frozen crimson clover kills it. After your crimson clover goes to seed, double-disk it in August and it will reseed itself.

This pasture plan suits most parts of Kentucky. If you can use

¹ For more detailed information about pasture crops and seeding methods, see Kentucky Circular 402, "Seeding Meadow and Pasture Crops," and Kentucky Circular 318, "Crimson Clover and Other Winter Legumes."

limestone and phosphate where needed, you will have better pasture for your calf. If you have manure to turn under, so much the better.

Before turning your heifer on the pasture give her the regular grain and hay feedings, and let her graze only an hour, morning and afternoon, of the first day. Then let her graze longer each day until she can graze as much as she wants to, without scouring. Then let her stay on the pasture during the day, but bring her to the stall and feed grain and hay night and morning. After the calf is used to grazing all day, you can gradually reduce the grain feeding, but still feed at least 2 pounds of grain daily and all the good legume hay the heifer will clean up.

Let the heifer stay on the small-grain pasture until the first joints appear in the plants; then turn her onto the crimson clover and mow the small grain or let the cows or horses clean it up. If the small grain heads out, it will shade the lespedeza and keep it from coming on as fast as it should. As soon as the small grain is completely eaten down, take the cows or horses off and let the lespedeza make its growth.

The crimson clover should furnish pasture until the first or middle of May. If the season is late and the lespedeza is not ready, you will probably have bluegrass or other pasture to turn the calf onto until the lespedeza is ready. Usually by the first of June the lespedeza is 2 or 3 inches tall, and will furnish plenty of pasture from then until fall.

If your small-grain and crimson-clover pastures are not separated by a fence, tie or stake the calf so as to keep it grazing where you want it. You will need about 15 feet of rope.

Pasture plan No. 2.— This plan calls for $\frac{1}{2}$ acre of a good stand of old bluegrass pasture and $\frac{1}{2}$ acre seeded to 1 bushel of wheat, barley, common rye, or balbo rye, and 5 pounds of timothy. Then sow 10 pounds of lespedeza in the small grain the following March or April, and 5 pounds of lespedeza on the bluegrass. Bluegrass furnishes good grazing in the spring and late fall, but the older bluegrass during the summer is not very good feed for a young, growing calf. (See Plan No. 1 for hay and grain feeding on pasture.)

Emergency pasture.— If for any reason you fail to get a stand of lespedeza for midsummer grazing, one of the best "catch crops" for Kentucky is sudan grass. Sudan grass should furnish your calf or heifer plenty of pasture through the hot, dry summer.

To get a stand of sudan grass rework the topsoil, where lespedeza failed, until you get a good seedbed. Then about June 1, sow sudan grass at the rate of 25 pounds of seed per acre and cover to a depth of $\frac{1}{2}$ or $\frac{3}{4}$ inches. After the sudan grass is mature, cut it for hay before it seeds in September.

Keep weeds out of your pasture.— As the pasture you start will be used by your heifer when she is producing milk, you must be very

careful to keep it free from wild onions, because these give milk a very bad flavor. In keeping your pasture free from wild onions or wild garlic there are two things to watch:

(1) Buy and sow seed that contains no seed of wild onions or wild garlic. Read carefully both sides of the tag on every bag of seed you buy. If the tag lists seed of wild onion or wild garlic, don't buy that seed.

(2) Dig every wild onion or wild garlic plant in your pasture. Dig up the whole plants—bulbs, root, and tops—and burn them. A sharp narrow spade is best for this digging.

There are other bad or noxious weed seeds which may be mixed with the seeds you wish to sow. Some of these are buckhorn, dodder, dock, oxeye daisy, sorrel, Canada thistle, corncockle, Johnson grass, and quackgrass. Try to avoid seed containing any of them. You have enough weeds at home without buying and planting more.

CARE OF HEIFER FROM 12 MONTHS UNTIL CALVING

When 12 months old, your calf is called a yearling. From 12 to 18 months she is a junior yearling; from 18 to 24 months she is a senior yearling. After she is 24 months old she is, of course, a 2-year-old and from then on the age is given in years, as 2-year-old, 3-year-old, and so on.

Record of Weight and Feed

Your heifer, if she has had enough feed, hay, pasture, and water, should reach at least the average weight for her age. The following weights are good averages at 12 months: Jersey, 450 pounds; Guernsey, 500; Ayrshire, 525; Holstein, 625; and Brown Swiss, 650 pounds. A Jersey heifer after 12 months old should gain 20 to 30 pounds a month and should weigh about 730 pounds when 2 years old. A Holstein heifer should gain 25 to 45 pounds per month and weigh about 1,070 pounds at 2 years. A Guernsey heifer should gain 20 to 35 pounds a month and should weigh about 820 pounds when 2 years old. Swiss heifers should gain from 30 to 50 pounds per month and weigh about 1,200 pounds when 2 years old.

If there are stock scales which you can use regularly, weigh your heifer once a month to be certain of her growth. If you cannot do this, then measure her heart girth once a month. A livestock measuring tape shows the average weight corresponding to different lengths of heart girth. If you cannot get a livestock measuring tape, use an ordinary tape measure, and record her girth instead of her weight. Make a note of the heifer's weight or measurement on the same day each month, and also put down the total amount of milk and grain feed, and hay eaten by your heifer up to that date. Use the form given in the "Dairy Project Record Book" for this information.

A bull calf to be kept or sold as a herd sire should have the same careful treatment as a heifer calf. Put a ring in the bull calf's nose and when you lead him, snap a 5-foot staff to the ring. Never lead a bull except with a staff. If the bull "acts up" just ram the staff against the ground and hold it there until he quiets down.

General Management and Protection from Disease

(See also pages 7 to 9.)

Keep your calves and heifers in a lot or pasture to themselves until they are mature and do not turn them in with the cows unless you know the cows are free from Bang's disease and tuberculosis.

After the heifer is a year old, and at least 2 months before she is bred, have a veterinarian test her for Bang's disease and tuberculosis. If she has Bang's disease, she may lose her calf later on, and if she has either Bang's disease or tuberculosis her milk must not be used unless it is pasteurized. In either case, she would not be a profitable cow and she would also most likely spread the diseases to other cows on the farm.

Your junior yearling heifer should be on good pasture as many days as the weather permits. She should have an abundance of permanent pasture with different grasses mixed with red clover, white clover, sweet clover, hop clover, alsike clover, or lespedeza. In winter you should have at least 1 acre of small grain to turn her onto when the pasture is not frozen or the ground too muddy.

Keep your heifer where she can get clean water at all times. If it is at all possible to provide otherwise, don't let your heifer drink from a pond where cattle and other livestock can wade in and befoul the water.

Keep fine-ground limestone and salt in a box in the heifer's stall. If the heifer is not getting legume pasture or legume hay, keep a box of steamed bonemeal in her stall along with the boxes of salt and limestone. Keep the bonemeal in a separate box.

If you have plenty of good pasture for your yearling heifer, the job of caring for her may be divided into two parts—winter feeding and summer feeding.

Winter Feeding

A yearling heifer should have all the good alfalfa, lespedeza, or clover hay she will eat, and silage if you have it. Start with about 4 or 5 pounds of silage, and if the heifer eats it all, feed this amount each day for the first week. Feed 6 pounds a day the second week, 7 pounds the third week, and so on until the heifer is eating 10 to 20 pounds of silage each day—or all she will eat after being fed grain and hay. Holstein and Brown Swiss yearlings will eat about $\frac{1}{4}$ to $\frac{1}{3}$ more silage than Jerseys or Guernseys.

A pound of good legume hay is worth about 3 pounds of silage

in feeding value, but silage is a good substitute for grass in the winter or when little or no grazing is possible.

The amount of grain your heifer needs depends on the kind and amount of hay and pasture she is getting, and also on the flesh she is carrying. If she is thin she will need more feed than if she is in good condition. If the heifer has all the good alfalfa or lespedeza hay she wants and 10 or more pounds of silage a day, she will not need more than a pound or so of grain each day. If she loses flesh, give her more grain.

If grass (nonlegume) hay is fed, and silage or fodder, your heifer should be given 3 to 5 pounds each day of the following grain mixture: 2 parts corn-and-cob meal, 2 parts wheat bran, and 1 part oilmeal.

Watch your heifer eat. If she takes her feed eagerly and does not grow thin, she is doing all right. Don't try to make her fat; just keep her in good health and in thrifty condition.

In very cold weather, it is always a good rule to feed about 2 pounds more grain per day than usual, regardless of the quality of hay and other roughage.

Summer Feeding

Summer feeding of your yearling heifer is very similar to feeding a calf when it first starts to graze. When spring grazing comes on, don't just stop the winter feeding program and turn the heifer out to grass. For the first week don't turn the heifer on grass until the dew is off. Give her a good fill of hay and grain, before letting her graze the first day. And after she has grazed an hour or two, bring her back to her stall and let her have all the hay she wants until time for the next grain feeding. Let her graze an hour longer each day, until she is able to stay on pasture without scouring. If the new grass causes her to scour, reduce the time she is on grass, until scouring stops.

When you start your yearling heifer on spring grass, reduce the grain feed, especially the protein feeds such as bran and oilmeal, until the heifer will be getting only 1 or 2 pounds of corn or barley each day, with hay, and no bran or oilmeal. If you have plenty of growing grass with clover or lespedeza in it, you may even feed no grain at all. If, however, the grass fails at any time, gradually increase the grain mixture again as you see the grass failing.

Age to Breed Heifers

Too many heifers in Kentucky are allowed to run in a pasture with a bull. This is bad practice because most heifers handled in this way are bred too young. Heifers should not be bred before they reach the following ages and weights:

<i>Breed</i>	<i>Age at which to breed heifers</i>	<i>Weight</i>
Ayrshire	18 to 21 months	600 to 675 pounds
Brown Swiss	20 to 24 months	850 to 950 pounds
Guernsey	17 to 20 months	550 to 625 pounds
Holstein	18 to 21 months	700 to 800 pounds
Jersey	15 to 18 months	500 to 575 pounds

Heifers bred too young and too small also calve too young, and never grow as large as they should.

When your heifer is old enough and large enough, have her bred to a good dairy bull of the same breed—registered, if possible. (Ask your county agent for Kentucky Leaflet 99, "Dairy Bulls," for information on selecting a sire.) Record the date, kind of bull, name, registry number, cost of service, and name and address of the owner of the bull. If both the bull and your heifer are registered, get a "bull permit" from the owner—that is, a signed statement from him that his bull served your heifer on that date. You will need this record in registering the heifer's calf.

The average time from breeding the heifer until she calves is 283 days. This is called the gestation period. To breed for the shows, remember that senior yearlings show best when springing. Older cows show best about a week before freshening. If you are interested in a dairy show, you should take the date of the show into account in breeding the cow or heifer.

Feeding a Heifer After Breeding

During the 9½ months from breeding to calving, your heifer will need better care than before she was bred. She will need enough feed, hay, pasture, water, and minerals for her to continue her own growth and to produce a good calf. A Holstein or Brown Swiss heifer calf should weigh about 90 pounds at birth; a Guernsey about 65 pounds, and a Jersey about 55 pounds.

Your heifer should not get too much grain, but if pasture is not plentiful and of good quality she should have at least 3 to 5 pounds of mixed feed a day soon after breeding. If you have excellent pasture and legume hay, 1 or 2 pounds of grain mixture per day will carry your heifer nicely until 2 or 3 months before calving time.

If your heifer is bred in late fall when pasture is becoming dormant, or later, feed about 1 pound of grain for each 100 pounds the heifer weighs, and continue until grass begins to grow in the spring. Then, if it is not too near calving, reduce the feed gradually to half the amount you were feeding and thus make better use of the new grass. If you have good grass or if you are feeding legume hay, a grain mixture of 2 parts of corn-and-cob meal and 1 part bran is a good feed

for your bred heifer. If you have poor grazing and have only mixed hay, feed a mixture of 4 parts of corn without the cob, 2 parts of wheat bran, and 1 part of oilmeal.

A good mixture to feed in the last 2 months before the heifer freshens is 2 parts corn, 2 parts bran, and 1 part linseed oilmeal. While mixing, add 2 pounds of bonemeal and 1 pound of salt to each hundred pounds of feed. If your heifer is not becoming too fat, you may let her have all of this feed that she will clean up at each feeding. If she shows signs of becoming too fat or patchy, reduce the feed. Keep limestone, salt, and bonemeal in separate boxes in the stall where she can get them whenever she wants them. Also see that she has all the clean water she wants.

About 2 weeks before your heifer freshens, begin reducing the grain by gradually leaving out the corn and oilmeal, so that 8 or 10 days before calving she will be getting a mixture of 4 parts bran and 1 part oilmeal. Feed her what she will clean up twice each day. If grass is excellent she will need only about 2 pounds of this mixture with hay each day, but if pasture is poor she may eat up to 6 pounds a day in 2 feedings. If you can't get linseed oilmeal, feed bran and oats the last 2 or 3 days.

If you are feeding silage, feed only half as much as usual for a day or two after calving. Let the heifer have all the other roughage she wants.

Care at Calving

Before she calves, your heifer should get accustomed to the place where she will be milked. If you have stanchions, begin feeding her in a stanchion 3 or 4 weeks before she calves, to get her used to eating with the other cows. If you intend to milk her in a stall, feed her in that stall the last few weeks before calving. In winter or other unfavorable weather, provide a clean, well-bedded stall for your heifer to calve in. In warm weather a shady lot is best.

The heifer should not be bothered while her calf is being born, unless she needs help. But, if possible, you should be with her, ready to help if needed. If you have taken good care of her, she will not be uneasy with you there and will let you help her better than anyone else.

Don't be disturbed if your heifer calves a few days either before or after the 283rd day. Usually a calf will be born within half an hour after it starts. If the heifer labors more than an hour, you should see if the calf is in the right position to be born, that is, with its muzzle and front feet coming first. If the heifer is taking $1\frac{1}{2}$ hours or more to deliver her calf you should help her by holding the front feet of the calf and pulling with downward motion when the heifer labors or strains. If the calf is in any other position you had better get an experienced stockman at once to help you.

Clean your hands and arms thoroughly before helping the heifer deliver her calf, and use alcohol or stock dip to disinfect your hands. After the calf is born, remove the phlegm and membrane from its mouth and nostrils if they are stopped up with it. If the heifer is strong, and the calf is down and unable to get up, she will start cleaning it by licking it. If the calf fails to breathe, try to start breathing by regular pressing down and then releasing the fore ribs. If the heifer fails to lick the calf and the weather is cold, rub the calf dry to prevent chilling. After helping, wash your hands well with soap.

Disinfect the calf's navel with iodine as soon as the cord which attaches it to its mother is broken.

As soon as the calf can stand and tries to suck, help it get the milk. The first milk is called colostrum. It is laxative and is very necessary to the health of the calf.

Watch for the afterbirth and take it from the stall or lot as soon as the heifer gets rid of it.

The day your heifer calves give her all the water and hay she wants. If it is winter, warm the water for her. She should have a large amount of water after she calves, but if the water is very cold she will not drink enough. Feed her little or no grain this first day, except perhaps a light feed of bran.

If your heifer calves during very cold weather, it is a good idea to keep a blanket on her for a day or so after the calf is born. But watch her and if the blanket causes her to sweat, take it off and put a lighter one on until she cools. Don't allow her to chill. Stay around and notice whether or not she seems to calm down and is comfortable.

As soon as your cow and her new calf are doing all right, get your records and add up the total amount of feed and the total cost of grain, hay, pasture, and the other expenses. You will then know something about the planning and expenses of raising a baby heifer calf all the way to milk production. Now you are ready to start being a dairyman.

CARE OF COW AND CALF

The first 2 or 3 days after the heifer calves feed her no grain except bran, and then begin adding oilmeal to the bran, equal parts of each (by weight) and 2 or 3 pounds of this mixture per day. After 2 days of bran-oilmeal mixture, add corn and oats gradually, not feeding over 6 or 7 pounds a day until after the 7th day.

After the first week of careful feeding, start changing to the milking-herd ration and increase the amount of feed each day until at the end of 3 weeks after calving, you have the heifer on full feed. Light feeding the first week after calving is the best precaution against milk fever.

After taking the calf away from the dam, weigh the milk night and morning for the first month. You will need this information in determining the amount of grain to feed the heifer each day. After the first month, weigh the milk one day each month, always on the same day of the month. Then multiply the pounds of milk by the number of days in the month and you have the amount of milk to credit your heifer or cow for that month.

For care of the new calf, see pages 5 to 9.

Milk from a cow with a new calf should not be used on your table nor sold for drinking until at least 5 days after the cow has freshened.

Be patient and gentle with your heifer at all times and especially before and after calving. Gentleness and patience are very necessary the first few times you milk your heifer. It is natural for the baby calf to nurse its mother, but you may have to get her used to a person milking her, just like you had to get her used to being brushed or led by a halter.

It is best to keep the heifer in a stall with her calf until you are ready to take the calf away from her. Don't let other cows or any work stock into her stall. After you take her calf away, you can turn her with the other cows if she shows no signs of needing further attention.

Remember that the calf will not take all the milk from the dam's udder the first few days and you will need to milk her 2 or 3 times each day. But do not milk her dry for 48 hours or so after she freshens. Heifers seldom have milk fever even though the udder may appear strutted and inflamed. The calf should need only 6 to 8 pints of milk each day for the first few days. After the calf nurses, milk the dam to relieve pressure on her udder.

If the udder is badly inflamed, several light milkings the first few days will be helpful. After each milking, gently massage all quarters of the udder with a downward motion. Massaging stimulates the blood circulation and this helps clear the inflammation. If the inflammation remains severe, bathe the udder twice daily with water as hot as your hand can stand until the inflammation goes away. After the hot-water treatment, dry the udder, apply mentholated vaseline and rub it in thoroughly. Keep the udder warm after the hot application. If the weather is cold, cut holes in a feed sack for the teats to go through and tie the sack over the back of the heifer. This helps prevent the udder chilling after the hot-water treatments.

If inflammation continues severe in the udder of a mature cow, and she shows extreme discomfort, get the advice of a good dairyman or call a veterinarian.

FEEDING FOR MILK PRODUCTION

A heifer with her first calf has not finished her growth and is not yet a mature cow, but has started her first lactation or milking period. So, when you plan for her feed, hay and pasture, you must remember that she now must complete her growth and also produce enough milk to leave a return after the cost of her feed is considered. Nevertheless, she should be bred again in about 3 months, which means that from that time she will have to carry and deliver another calf. This makes three jobs for your heifer—completing her own growth, making you a return on her milk, and carrying another calf. She will need more grain, hay, and pasture than ever before, and they should all be of the best quality. Provide at least 2 tons of alfalfa, lespedeza, or clover hay and about 20 bushels of corn for each milking cow or heifer, if you have Jerseys or Guernseys; if you have Holsteins or Brown Swiss, provide 3 to 4 tons of alfalfa, lespedeza, or clover hay and about 35 bushels of corn for each milking cow or heifer. These amounts should amply take care of your producing cow and her calf. Grow as much of the corn and hay as possible and get protein concentrates, such as the oil-meals and bran, from dealers or millers.

If you have plenty of good silage, you will need about 1 ton less of hay per cow.

However, if you do not have enough grain mixture to feed all the way, provide more hay than recommended above. Few persons have enough hay. So store as many tons of hay as you think your heifer or cows will need and add an extra half ton per cow for times when you have little grass.

See your county agent or write to the College of Agriculture and Home Economics at Lexington for information on the feeding of dairy cows. Ask for Circular 364, "Feeding Dairy Cows," Leaflet 83, "More Profit from Your Milk Cows," and Leaflet 54, "Summer Feeding of Dairy Cows."

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