



5

LATE GESTATION

Of the approximately twenty-one weeks between breeding and lambing, the last six are the most important. The ewes needed to have a generous food ration immediately after breeding to get the pregnancy off to a good start, but then a maintenance feed level was adequate for almost three months. During that time the fetus or fetuses increased in complexity to the point where most of the final organs were formed by the almost miraculous train of events in which a single cell divides and transforms into the specialized cells of distinct organs and parts of the growing lamb.

During the last six weeks of gestation the already complex fetus grows in size and achieves the final form of a lamb. This rapid growth puts a lot of demands on the ewe. She needs better feed, closer watching, and more detailed attention. A well-orchestrated late gestation will mean a simpler task at lambing, and every bit of effort that the shepherd puts out now will be more than repaid when the ewes start birthing.

NUTRITION

The ewes will require a great deal more food during the last part of gestation. They can no longer be expected to live partly off their own reserves when they are carrying fast-growing lambs. A ewe giving birth to twins or triplets needs protein and other nutrients, not only for the lambs themselves but for the placenta and associated tissues. We have had ewes give birth to triplets with a total weight of forty pounds, not counting the placenta and other tissues, so the demands are very large indeed.

Food Requirements

The total feed given to the ewes must be increased 60 percent or more to satisfy fetal growth. If the early gestation ration has been marginal, an even larger increase may be called for. For an average-sized ewe who has been getting three to four pounds of hay a day it will mean a jump to five to seven pounds of hay, which is getting close to the limit of how much food a ewe can stuff into her rumen.

One feeding method that is used by some sheep raisers is to give the ewes better quality hay during late gestation. The term "better quality" should be examined closely, however. If the hay is the same as that previously fed (except that it is greener and just looks better), then no gain has been made. It may well have a little higher protein and perhaps more carotene to provide vitamin A but still not be nutritious enough. What is needed is a lot higher protein, such as might be provided by a later cutting of alfalfa. If in doubt, have the hay analyzed.

Giving better quality hay may not be sufficient because the ewes still need a 60 percent increase in total digestible nutrients (TDN). However, the rumen can accommodate only so much hay, and while alfalfa cut in the earliest bloom stage may be over 50 percent higher in protein than lower quality hay, it is only about 10 or 15 percent higher in TDN. Thus the ewe might be getting plenty of protein but still be lacking in energy, because she won't be getting enough calories.

The usual solution to this dilemma is to provide a high-energy feed such as grain along with the hay. A ration of two pounds each of corn and hay will amply provide for a ewe's needs and won't fill up her rumen too much. Let me emphasize I am assuming that a lot of the ewe's protein requirement is coming from the roughage, the hay. Corn is only about 10 percent protein. This

means that the hay must be about 12 percent protein, at a minimum. I stress this point because I hear of sheep raisers who have tried to carry the ewes through early gestation on straw or corn stalks, then think that they can make up for their past sins by giving the ewes, in addition to the same roughage, a couple of pounds of grain apiece for the last month. The corn or other grain will help with energy needs but will not even come close to providing the protein needed. In such a case, if straw or such feed was the only roughage, a high-protein source such as soybean meal would have to be provided as well as the grain.

If you have been a bit casual about the rations you provide your sheep for the rest of the year, get serious now. Refer to appendix 5 and spend a few minutes calculating whether you are feeding enough of the right things. Incorrect feeding now can ruin a year's planning and work and make for many unhappy hours in the barn with weak lambs, sick ewes, and even abortions caused by malnutrition. If you anticipate a lot of triplets, be sure to calculate the ration accordingly and feed still more because the ewes will need it. A ewe carrying twins doesn't require much more feed than one carrying a single fetus. A ewe carrying triplets has energy needs that are about 15 to 20 percent higher than the ewe with a single or twin fetus.

Mineral needs must be carefully evaluated too. The ewes need calcium and phosphorus and some trace elements in order to do their job of building lambs. Two pounds each of corn and quality alfalfa will provide the minimum needs of calcium and phosphorus. Many producers also give a free-choice mixture of salt and dicalcium phosphate in a half-and-half mixture to ensure that there is adequate calcium and phosphorus. If the calcium content of your hay is low, as is usually the case with grass hays, you would be wise to balance the phosphorus in the grain by adding 2 percent finely ground limestone to the corn or other grain.

Trace elements are usually present in sufficient amounts in ordinary feed, but you can use trace mineral salt in your salt-dical mixture to be safe. Remember that there is a problem of copper poisoning with sheep, so never add trace mineral salt to feed or put molasses in a salt mixture to encourage consumption.

If you have found that selenium is deficient in your feeds, you can give a free-choice sheep mineral mix that contains supplemental selenium. If you prefer to prepare your own mineral mix, there are also selenium premixes available that can be blended with salt and dical to make a satisfactory min-

eral supplement. Be sure that mixing is thoroughly done, because selenium is highly toxic in excess—so don't just throw in some premix and stir it around with your hand. For the same reason, be sure to check your calculations as to how much premix to use so you don't misplace a decimal point and feed too much or not enough. A salt mixture cannot legally contain more than 90 ppm selenium, which is only .009 percent. If you mix your own, calculate carefully so as not to overdose. One must be sure that sheep have adequate salt available at all times so individuals do not gorge and receive toxic levels of selenium or other trace elements.

Many ewes will need some additional vitamin E at this time as well. Ewes eating hay rather than green pasture will doubtless be short on E. You should supplement either in feed or in a salt/mineral mix at a rate to give the ewes something on the order of 100 IU/day. Ewes generally eat about $\frac{1}{4}$ – $\frac{1}{2}$ ounce a day of the salt mixture. Excess E will not be toxic, but not needed either. Do not depend on the E in ADE mixes added to feed. The amount of E in those is trivial, being there primarily as a preservative. The E will not keep until the following year, so plan to use the whole bag and feed accordingly.

Grain Feeders

If you are feeding grain, you have to have some sort of feeder, and some types are better than others. As far as I know, there is no such thing as a perfect feeder. If hay is fed in feeders, perhaps the grain can just be poured over the hay. Mixing of the grain with hay eliminates the problem of a ewe taking too big a mouthful and choking. If feeding grain with hay is not practical for you, then grain feeders of some kind will have to be used.

The first rule of trough design is that the sheep should not be able to stand in it, for the obvious reason of preventing their tracking manure into the feed. This rule eliminates shallow, open troughs. Raising a trough off ground level is some help. To further frustrate the ewe who likes to stand in her feed, you can run a crossbar down the length of the trough. Another practical design is to have narrow slots along the sidewalls of the trough so the sheep have to stick their heads through to eat. Such feeders are generally rather heavy because of all the lumber used and are best for permanent installations, unless they can be moved with a tractor-loader or the like.

In order to reduce the problem of the sheep eating too fast and choking, use a design that forces them to take small mouthfuls. One way to do this is to nail cleats to the bottom of the trough or leave nailheads sticking up an

inch or so. One producer told me that he puts small rocks in the trough bottoms to accomplish the same end.

I finally made some feeders that work well, after a number of failed experiments with various types. I obtained some fifty-five-gallon drums made of heavy plastic from a cheese plant. These were cut lengthwise with a saber saw to give four troughs. A two-by-six board was then nailed lengthwise to bridge the space between the two pie-wedge shaped ends, then two-by-four legs were attached to hold the troughs off the ground. I put three of the basic units together to make a three-compartment trough that will feed up to eighteen woolled sheep at a time. These troughs are light and sturdy, and sheep don't stand in them at all. Also, the ewes have to stick their noses under the two-by-six to get a mouthful of grain, and they are inhibited from taking too much at one bite. (The sketch that opens the chapter on flushing shows some of these troughs in use.)

A sheep-raising neighbor got some of the same sort of plastic drums, cut them in half lengthwise, and placed them on the ground with no legs attached. He says the sheep won't stand in them because they roll underfoot. I'd still be a little concerned with the gulping problem, but perhaps a few rocks would take care of that.

Time of Lambing

Late gestation is the period when the shepherd can help determine the time of day that lambs will arrive. The day of lambing is pretty much established by the day of breeding and the ewe's natural gestation period, but the time of day can be influenced. Sheep, like all animals, have natural rhythms for all of their bodily functions. The daily rhythms are termed circadian (from the Latin for "approximately daily"), and they control all daily events in a sheep's life, including the time of day of lambing. Scientists have found that most mammals, including people, have internal clocks of some sort that regulate the circadian rhythms, but they also have found that the internal timing is not exactly on a twenty-four-hour cycle, but may be longer or shorter. However, animals receive clues from external sources during each day that reset the internal clock to synchronize it with a twenty-four-hour day. The so-called jet lag that travelers encounter when they travel long distances east or west in a short time is a consequence of the internal circadian rhythms having to adjust to a sudden change in the time of the external clues, the most important of which is the time of sunrise and sunset.

Unless the shepherd confines the sheep in a light-tight barn, there is no way to alter the effects of the times of sunrise and sunset. What other clues are presented to a sheep each day? I can think of none other than time of feeding, and scientists who are concerned with such things have found that the time of feeding of a hungry animal is indeed a clue that resets internal timing. We have experimented with the time of feeding of grain to our flock and have found that feeding at noon results in about two-thirds of the births occurring between six in the morning and six in the evening, with almost none between ten at night and two in the morning. It is very important not to disturb the sheep at night more than needed. A very low-wattage light, such as a night-light bulb high in a barn, will provide enough light to dark-accustomed eyes so that bright lights do not have to be turned on. Move slowly and quietly and for heavens sake don't have a radio blaring away at night.

Feeding at six in the morning roughly reverses the lambing schedule, with most lambs coming between six in the evening and six in the morning. Thus a shepherd can choose, to some extent at least, when the lambs will arrive, which is quite a convenience.

Some farmers and university researchers have reported that cows fed in the early morning and again at night have mostly daytime births. I have seen opposing reports on lambing of ewes on this schedule. I have never tried this plan. I can report that noon feeding does work, both for me and for a number of shepherds who have tried it and told me about their results.

ENVIRONMENT AND EQUIPMENT

The main change in the environment of the flock is that the expectant mothers should have access to a barn or other shelter for lambing. Shelter may not be a vital thing in some climates insofar as protection from the weather is concerned, but it is important for the convenience of the shepherd. It permits the ewes to be penned up with their lambs for the first two or three days to get acquainted and also keeps them where the shepherd can observe them conveniently.

In cold climates the lambs will profit from some protection from the weather for at least the first couple of days, although once a lamb is dry it can tolerate extremely cold conditions. Shearing of ewes prior to lambing is highly recommended, and the freshly shorn ewes will need housing right after

shearing, especially if the weather is cold or wet, until they start to grow a new coat.

Actually, the shelter should be available prior to either shearing or lambing because a ewe that is soaked with rain or covered with snow and ice cannot be shorn. A moist fleece will rot, and drying fleeces off the ewe is not practical. In addition, sheep with wet fleeces carry moisture into the barn where it is not wanted. For these reasons, protection from precipitation is very helpful. An open-sided structure such as a hay shed is appropriate because its function is to keep new precipitation off the ewes while their own body heat and shaking gets rid of any accumulated snow or wetness. Just giving them access to a shelter will not necessarily do the trick, because some of them still stay out in the rain or snow, so they should be confined during precipitation in the days prior to shearing. Even if the ewes are dry, it is worthwhile to pen up a group closely for the night before shearing because the warmth seems to make the sheep easier to shear the next day.

After they are sheared, the ewes will need little encouragement to stay inside in cool or cold weather. This stay-at-home tendency is very helpful at this time because the ewes will lounge in the barn instead of in the yard or pasture and will be much more likely to be inside for lambing—a great convenience for the shepherd-midwife and possibly a lifesaver for the lambs.

A useful plan is to encourage the ewes to stay in the barn or other lambing quarters, but to feed them somewhere else so they still get lots of exercise. It may be just luck, but Teresa and I very rarely experience any of the really bad lamb presentations: the tangled legs of multiple lambs, the head that is back and impossible to straighten, or the other uterine mixups one hears about. We attribute this to the fact that the ewes get plenty of exercise; this keeps their muscles in tone, and the movement helps get the lambs into the right positions in the uterus before lambing begins.

Now is the time to get the barn and equipment in final shape to be ready for lambing. Make sure that all of the panels were repaired to a usable state, replace lightbulbs or wash the cobwebs and flyspots off the ones that still work, and make sure bedding is adequate. Get out your scale and make sure it is in working order to weigh the lambs at birth. The easiest scale is a hanging one. Put the lamb in a big plastic bucket and hang the bucket on the scale hook. Be sure the scale is one that allows you to tare off the weight of the bucket so it reads directly in lamb weight, without mental arithmetic. You can also make a sling out of some canvas and a couple of sticks sewed to each end

that holds the lamb under its belly, and can be hung on a scale. Such a sling is also handy for carrying lambs around.

This is also the time to make sure that you have all the equipment and supplies you'll need during lambing, and that you have them where you can get to them when you need them. We kept most of our supplies in a big cabinet on the barn wall that is only five inches deep. With that shallow cabinet, things don't get hidden behind other things, and it doesn't take up a lot of floor space either. Everyone will have a slightly different list of items, but I'll give you a list so you can use it as a starting point for your own compilation.

Most of the items are things you don't need in late gestation, but when the lambs start popping it will be too late to start stocking up. Also, you may well find that you can save a lot of money by ordering many items from mail-order suppliers. In addition, with all due respect to local area merchants, sheep items are often simply not available at local outlets without a long wait for a special order. If you are sufficiently organized to order well ahead of time, you might stir up some interest in sheep products so that next time your local druggist or veterinarian would have them in stock. I'll give a checklist of items and then explain more about them following the listing.

Before Lambing

dexamethasone	mild bar or liquid soap
coarse twine	lubricant
examining gloves	calcium-magnesium solution

At Lambing

iodine solution	oxytocin
towels	colostrum
navel cord clips	lamb milk replacer
ear syringe	5 percent dextrose solution
oxygen	selenium injectable
Dopram V	penicillin
blood stopper	<i>Cl. perfringens</i> type C-D antitoxin
twine	PI-3 nasal vaccine
hair dryer	injectable iron-dextran solution
heat lamps	electrolyte mix
lamb nipples and bottles	uterine boluses
stomach feeder	

After Lambing

docker	Terramycin
Elastrator tool and bands	soluble sore mouth vaccine
tetanus antitoxin	<i>Cl. perfringens</i> type D antitoxin
Quartermaster teat syringe	kaopectate

Dexamethasone (Dexasone, Azium) is one of a class of compounds called corticosteroids, all of which have potent physiological effects. It can be used to induce lambing if that is needed. It and similar compounds (such as flumethasone) are available only from your veterinarian and should be used under a vet's guidance. I'll discuss its use under ketosis in this chapter.

Coarse twine is useful to help pull out lambs in some difficult births. A woven tape called umbilical tape that you can get from your vet is equally good or better, or a gauze bandage may be used. Smooth cord such as that made from cotton or nylon is too slippery to be useful. Cut some of the twine, gauze, or tape into three-foot lengths and store it in a jar in some rubbing alcohol diluted one to one with water.

Examining gloves are thin rubber gloves that can be slipped on before entering the ewe with your hand. They come only up to your wrist, but they cover dirty fingernails. You can buy these from a vet or physician. Discard them after one use. They also afford protection to you against infections from an infected uterus.

Soap is available as mild bar soap without perfume or antibiotics or as liquid green soap at your drugstore. This is used to wash up before entering a ewe and to clean up afterwards. It can be used as a lubricant as well.

A lubricant is helpful to make the lamb slip out more easily or to let your hand and arm slip in more easily. Some people just use soap, which is fine provided it is not an irritating sort. My favorite lubricant is one sold by the McGrath Company (P.O. Box 148, McCook, Nebraska 69001) called lubricant gel. It is a powder that is mixed with water to produce a nonirritating, thick liquid that is unbelievably slippery. Liquid soaps are positively raspy by comparison. McGrath sells mostly to vets, but will sell direct to you if you don't have a local source.

Solutions containing calcium, magnesium, phosphorus, and other materials are used for the treatment of milk fever, a condition that can affect ewes before or after lambing. These solutions are sold under brand names like Caldex, Cal-Phos, and Cal-Mag. I'll discuss their use under Milk Fever in this chapter.

Iodine solution is used to apply to the navels of newborn lambs. Don't waste money on spray containers of iodine. You can buy it in gallon jugs much more cheaply. You can use either the so-called gentle iodine or the 7 percent tincture. The 7 percent type is more irritating, but it also has a stronger drying action on the umbilical cord.

Towels are a requirement at lambing as far as I am concerned. In cold weather you'll want to dry the lambs and your hands. We have a collection of old terry towels that we have scrounged through the years. Try friends, relatives, and garage sales.

Navel cord clips are little plastic gadgets that are clipped onto the umbilical cord of the lamb at birth. They are supposed to prevent disease-causing organisms from entering the lamb's body via the broken cord. We used them some years and not others with no apparent difference in lamb health. Now and then a lamb will bleed profusely from the broken cord, in which case a clip can literally be a lifesaver, so having a few in reserve is a good idea. We keep some in a jar of rubbing alcohol to be ready for use if needed. You will find that ewes chew them off and they get lost in bedding, so have extras.

An ear syringe such as those for human babies is used by some to clear the lamb's nostrils. A towel and finger do just as good a job in most instances. An ear syringe can also be used to administer a soapy water enema.

A small tank of breathing oxygen is a handy luxury in the lambing barn. We use a portable tank that is intended for use by a light-plane pilot. The face mask that was intended for a human fits a lamb just right if it is held upside down over the lamb's nose and mouth. A short (15- to 20-second) shot of oxygen will do wonders for a lamb that has had a prolonged and difficult birth. Oxygen is not essential but can be very useful. If you cannot find a used bargain at a local airport, you can rent small tanks from medical rental places.

Dopram V (Doxapram Hydrochloride) is a potent drug that stimulates breathing. It can be a lifesaver for slow, weak lambs. You'll need to get it from a vet. I'll discuss in the next chapter.

Blood stopper is a powder that is applied to bleeding wounds to staunch the flow of blood. If your barn is sufficiently rustic, you can grab a handful of spiderwebs and apply them to the bleeding to help coagulation.

A few lengths of twine are helpful for tying a lamb's legs together to help grafting him onto a foster mother as I'll describe later in the chapter on lambing. Some producers even tie twins together by one leg so they don't get separated in the crowd with one of them becoming abandoned. Twine is also

indispensable in treating a prolapsed vagina, as discussed later in this chapter. Twines saved from hay bales are fine.

A hand-held hair dryer is a wonderful tool for lambing and can be used to dry hair during other parts of the year. There is nothing better for drying off a lamb quickly, which is very important in cold weather. The dryer is great for keeping a lamb's ears from freezing off. Dry ears are quite safe from freezing, but wet ones freeze right away. One caution: Some hair dryers really put out the heat, so be careful that you don't burn the lamb.

Heat lamps are useful to help slow lambs get going by getting them warmed up enough to be interested in nursing. Heat lamps should be used in moderation, and some shepherds think they should not be used at all. They certainly should be used only enough to get a lamb started, and that's all. If heat lamps are left on for long periods they seem to predispose the lamb to pneumonia, and there is no doubt that they are a fire hazard. Our fire inspector insisted they be hung from chains rather than rope or twine.

Some Pritchard lamb nipples and a few screw-top pop bottles are necessary bits of equipment. The holes in the nipples can be enlarged with a hot needle to increase the flow of milk.

A gadget of some sort for stomach feeding of lambs is a must if you want to save most or all of your lambs. I'll discuss the various alternatives in Lambing.

Oxytocin is a hormone that is present in any lactating animal. It causes the so-called letdown of milk in the udder. Natural production of oxytocin is stimulated by the hitting and sucking that nursing lambs do; it can also be stimulated by massaging of the udder. Some ewes do not let their milk down at first, presumably because some hormonal message is late. In such cases the shepherd can effect letdown by giving an injection of oxytocin. This is an item to get from your veterinarian.

Colostrum is the first fluid that comes from a ewe's udder when she freshens at lambing. It is not just rich milk; it also contains special proteins called antibodies that give the lamb temporary protection from disease-causing organisms. It is important that every lamb get some colostrum as its first meal, and you should have some on hand in your freezer for those lambs that get none from their mother for some reason. Ideally, you should have some sheep colostrum, but goat or cow colostrum will do. Steal some from each ewe and husband it for future use. The frozen stuff can be kept for years in airtight containers. Let it thaw slowly, without heating, because temperatures above 125° F will destroy some of the antibody protein.

You should have some lamb milk replacer on hand for orphan lambs. This is not a substitute for colostrum, and the lamb should get some colostrum before getting any other food.

A bottle of 5 percent dextrose (or glucose) solution is useful to provide a quick shot of energy to weak lambs. Some producers prefer to use solutions that also contain amino acids and electrolytes. Avoid the 50 percent solution since it has a dehydrating action. However, the 50 percent can be mixed with an equal amount of boiling water to make a warm 25 percent solution for injection.

There are injectable selenium and vitamin E mixtures that are used for prevention of deficiencies of these nutrients. If you have experienced white-muscle disease with lambs, you may want to inject newborns with this preparation. This is available from your veterinarian. Use only the product intended for lambs, not the stronger one for adult sheep. If you provide sufficient selenium in salt, this should not be necessary.

A bottle of penicillin G (the cheapest form) is handy at lambing. Some veterinarians recommend an injection of penicillin to all newborn lambs as a precaution against infection. One can give a penicillin injection to each lamb that was born unattended and hence did not get the navel cord dipped in iodine solution at birth.

If a lamb did not receive colostrum, it should get an injection of antitoxin against *Cl. perfringens* types C and D. The type C toxin is a common cause of lamb scours.

PI-3 nasal spray vaccine can be given to all lambs at birth as a precautionary measure against pneumonia. The use of this vaccine in sheep and lambs is not approved by the FDA.

It is commonly said that lambs do not suffer from iron deficiency. As I will mention in the next chapter, that may not be so. Injectable iron dextran such as is used with baby pigs can be given to lambs if you wish.

Electrolytes are soluble materials such as ions of sodium, magnesium, potassium, bicarbonate, and other chemicals. A lamb with scours loses fluids and electrolytes. Electrolyte solutions given orally (by a bottle if the lamb will suck or by stomach feeding if not) help to replace both lost water and electrolytes. Many commercial mixtures are available. A home-brewed electrolyte and amino acid mixture recommended by Colorado State University is as follows: 1 package fruit pectin, 1 teaspoon Morton Lite Salt, 2 teaspoons baking soda, 1 10½-ounce can beef consommé, plus warm water to make two quarts of solution. Make up a fresh batch as needed. Do not use a substitute

for the Morton Lite Salt, as it is used to provide potassium in the correct amount. Gatorade can be used, but it is inferior to the above mix.

Uterine boluses are placed in the uterus of the ewe after the shepherd's hand has entered, since it may carry with it pathogenic bacteria or other microorganisms. Our veterinarian thinks they are completely useless. Decide for yourself or ask your vet for a second opinion.

Ear tags come in a variety of sizes and shapes. In order to keep meaningful records, you must have some way of identifying each lamb. I discuss the various types of tags in chapter 6. Be sure to get an applicator for whatever type you decide to use.

Many sheep raisers paint-brand ewes and lambs in order to be able to spot quickly who belongs with whom. Paint brands are no substitute for ear tags because many brands become unreadable soon after application. Paint brands are handy, but you'll have to decide whether you think the extra work is justified.

You will need some way to dock (remove) tails. There is an electrically heated device that is highly satisfactory, and there are propane-heated ones also. Other gadgets that crush the tail to reduce bleeding are used with success too. Some shepherds use Elastrator bands.

Castration can be done with some docking tools or with various special tools. More information about both docking and castration is given in the next chapter.

To treat inturned eyelids (entropion) in lambs, have a syringe of Quarter-master mastitis treatment on hand to use, as described in chapter 6.

A dose of soluble Terramycin stops scours in some lambs. The problem with scours is that different flocks have different resident microorganisms, so what works for one may be useless for another. Try various antibiotics until you find one that works. Asking the person from whom you bought the sheep might be helpful. Mechanical aids such as Kaopectate are used by some.

If you are going to vaccinate for sore mouth (ovine ecthyma), you'll have to have the vaccine in stock. You will also be vaccinating all lambs against *Cl. perfringens* types C and D at some time, so order enough of that toxoid or bacterin to have on hand at weaning.

One final preparation that you may want to consider is to arrange for hired help to assist at lambing. This is especially important if one or more of the family holds an outside job and cannot be in the barn for part of the time. The way to save lambs is to have someone present for every birth. Nobody

can be there all of the time, so get some help if it is needed. Lambing commonly occurs during a slack period on farms, and you may have neighbors who would welcome a part-time job at that time.

HANDLING: SHEARING

Anyone who has lambed both shorn and unshorn ewes will tell you that you should shear before lambing, at all costs. There are a host of good reasons to shear before lambing. The ewes take up less space in barns and pens when shorn. They also will carry less moisture in their wool, and the wool will not get contaminated with bedding in the barn during and after lambing. A shorn ewe will stay in the barn at lambing (a convenience for the shepherd) and will also tend to stay in the barn in cold and wet weather after lambing so the new lambs are less likely to be exposed to weather that they can't tolerate. In addition, a shorn ewe is much easier for the shepherd to evaluate prior to lambing. Her vulva and bag are easily visible, as are her flanks, so the shepherd can see changes in her body conformation that precede lambing. Furthermore, a cleanly shorn underside makes it easier for the lamb to find the teats. On an unshorn ewe, some lambs will suck on bits of wool or dung locks instead of teats, and there is very little nutrition in a dung lock except if you put it in your garden.

From the point of view of a shearer, a pregnant ewe is a delight to shear. The swollen abdomen stretches out all of the wrinkles and makes the job easier, not to mention the fact that a pregnant ewe is a lot less feisty than a slender, open one. The quality of the wool may be better preserved by timely shearing before lambing. Some ewes will develop a so-called break in the wool at lambing. A break is a place where the fiber diameter of the wool is greatly reduced, so that it is weak at that point and will break when stretched. If the wool is shorn right at the break, there is no adverse effect because the break is at the end of the fiber rather than somewhere in the middle. Breaks in the wool can be caused by sickness, but the break at lambing is most likely caused by diversion of protein from wool growing to the growth of the lamb as well as to the production of antibodies for the colostrum.

If for some reason it is impossible to shear the ewes prior to lambing, they should at least be crutched to expose the vulva and trimmed around the bag area. Do try to get them totally sheared, though, if you possibly can.

In some areas shearers are hard to find, especially for the small flock. If you have difficulty finding a shearer, or are unhappy with the job done, then by all means learn to do the shearing yourself. Shearing isn't difficult; it just takes practice. In order to learn, you can work with a shearer or try to attend one of the shearing schools that are often sponsored by local and state sheep associations at members' farms and at universities with agriculture programs. Check with your county extension agent to locate the nearest school, or ask on an Internet sheep list. There is a widely praised shearing video entitled *Shearing Techniques with Fiona Nettleton* available from Rural Route Videos, P.O. Box 359, Austin, Manitoba, Canada R0H 0C0, 800-823-7703.

Don't be nervous and shy about learning to shear. Everyone at a shearing school was a beginner once, and they will go out of their way to give you pointers and to help you. If you have only a few sheep to practice on at home, try to locate some others to practice on, because only by shearing a lot of sheep can you become better. After you have shorn a hundred sheep or so you should be able to do one in less than ten minutes, maybe a lot less. If you are going to try to shear a lot of sheep at one time, be sure to have a helper or two to catch the sheep and set them up for you, and to take care of the shorn fleece. If you will catch for a good shearer you can see how a professional goes about it. He'll probably let you do one yourself now and then and will give you some valuable tips. Hardy's Gabriel Oak in *Far from the Madding Crowd* sheared a sheep in record time with hand shears.

"Well done, and done quickly!" said Bathsheba, looking at her watch as the last snip resounded.

"How long, miss?" said Gabriel, wiping his brow.

"Three-and-twenty minutes and a half since you took the first lock from its forehead. It is the first time that I have ever seen one done in less than half an hour."

The clean, sleek creature arose from its fleece—how perfectly like Aphrodite rising from the foam should have been seen to be realized—looking startled and shy at the loss of its garment, which lay on the floor in one soft cloud, united throughout, the portion visible being the inner surface only, which, never before exposed, was white as snow, and without flaw or blemish of the minutest kind.

—thomas hardy, *Far from the Madding Crowd*

Shearing equipment is of three types. The traditional hand shears are rarely used today to shear a whole sheep, although there are purists who still depend on their own hand power. Every sheep raiser should have a pair of hand shears for trimming and for fitting sheep for show and other light-duty jobs, but serious shearers should have a motor-driven shearing machine.

The least expensive power-driven shearing equipment is a hand-held electric motor with a sheep shearing head attached. For the small flock or for the beginner, that type is a useful tool and is very handy to have around even if more elaborate and powerful equipment is used for big jobs. The shearing head holds the cutting parts, which are called the comb and the cutter. The comb is a flat piece of metal with long teeth that penetrate the wool readily. Another metal piece, the cutter, oscillates back and forth over the comb to give the cutting action. Both comb and cutter have to be sharpened on a special sharpening plate or can be sent off for custom sharpening if the small producer doesn't want to invest in a sharpening rig. Lister, Oster, and Australian Sunbeam are common brands.

The self-contained type will do the job, but it is less powerful than larger machines. At a shearing school you will be taught how to adjust cutter tension properly and how to change combs and cutters and align them. Even if you are shearing only a few sheep, you should have three or four sets of combs and cutters.

For speedier shearing with large flocks you will want to invest in a large shearing apparatus. The big machines use a remote source of power, usually an electric motor that is hung on the wall or on a post. Power is transmitted through a jointed or flexible shaft to a handpiece that holds the comb and cutter. Because there is no motor in the handpiece, it is smaller and easier to use and doesn't get overheated, as the small motors can in heavy use. The extra power and wider cut possible with a remote-powered handpiece makes it the choice of the pros. The only difficulty for a beginner with a remote-powered unit is that the sheep has to be brought to the shearing machine rather than the other way around. Once a shearer gets enough experience, the sheep never has to be moved from an area about two feet square, but a newcomer may use an area the size of a small room.

Perhaps the best advice for a beginner is to learn with a self-powered device and then graduate to a bigger machine when and if skills and sheep numbers make it appropriate. Many shepherds will never need a bigger machine than the small ones. Incidentally, the small machines can be equipped with a

clipping head that is useful for clipping cows, goats, dogs, or other animals; it also does fine trimming on a sheep when fitting for showing.

Many shearers use a general-purpose nine-tooth comb, but there are variations for special purposes. Many combs flare outward to gather more wool in a single pass. A nine-tooth thin comb is a good compromise, giving a less tidy appearance than a thirteen-tooth one but being faster and easier to use. If the shorn sheep will not have access to shelter, or in extremely cold weather, one can use nine-tooth protector combs that have runners under some of the teeth to cut a bit farther from the skin and leave a stubble of protection for the ewe. Some shearers don't like these because they are slower, but insist on them if you have special needs—recognizing that you may have to pay a little more.

A self-powered machine with one comb and cutter set will cost up to \$200. The handpiece alone of a larger setup can cost twice that. You can expect to pay another \$300 to \$500 for the rest of the machine. A sharpening rig will cost about \$150 plus the cost of a motor. Combs and cutters cost \$10 to \$30 and up depending on the type.

Whether you or someone else does the shearing, the barn or shed should be prepared ahead of time. Do not bed the area down with straw just to make it look nice, because the straw will get into the wool and reduce its value. If the area needs bedding to cover mud and droppings, do the bedding a week or so ahead of time to give the sheep a chance to stomp it down a bit. You will need a place to accumulate the wool as it is sheared. If you sell individual fleeces to handspinners, you can roll up each one and put it in a plastic garbage or leaf bag. Do not close the plastic bag, because moisture has to be able to escape. If you sell your wool to the commercial market, you should pack it, untied, in a standard wool bag. Wool bags are giant burlap sacks that are hung from a sturdy stand so that the bottom of the bag does not touch the floor. They hold about two hundred pounds and up and are filled by a person standing in the bag using his feet to stomp and pack the wool tightly. The current trend is to bale wool and not use bags that contaminate the wool with vegetable or plastic fibers. The small flock owner doesn't produce enough wool to make bales, so check with local buyers to see what they require.

You will also need a shearing area that has some sort of smooth floor that can be swept clean between each shearing. A wooden floor is excellent, or you can use a large piece of heavy carpet turned upside down so that you are shearing on the woven back. If you live near a paper mill, try to get a piece of

the very wide belting they use when belts are replaced. The belts are ten to twenty feet wide and made of very heavy material. Don't try to shear on a tarp or blanket because these bunch up and are more of a nuisance than a help.

As you finish a sheep, the helper should tie the fleece with paper twine made especially for that purpose and place it in a bag or in a holding area. Never use any other kind of twine to tie a fleece, because fibers from the twine can contaminate the fleece, and a wool buyer will dock you or refuse to buy the fleeces. Paper twine is used because it softens in water and disintegrates so that it can be washed away with the dirt from the fleece. The modern trend is not to tie the fleeces. Again, check locally or ask your shearer.

If you use plastic twine, your wool will almost certainly be rejected by a buyer, because there is no practical way to remove plastic fibers from wool. For this reason, never use hay that is baled with plastic twine. The short plastic fibers left when the baler cuts the knot will get into the wool and totally ruin it.

Separate your wool into different types as you pack it. Lamb's wool should be separated from adult wool, and the adult wool should be separated according to type if you have enough to do so. You will get a better price for wool that is grouped.

Shorn sheep can be dusted with an insecticide powder to kill keds and lice, and hooves can be trimmed if needed. Be alert for bloat, because the excitement of shearing sometimes brings it on. Shearing also is stressful because usually strangers are around.

After shearing, the wool should be properly stored until it is sold, which usually means a place where it is kept dry. Wet wool will rot and be worth nothing. Wool bags stored on a damp floor invite trouble because the bag itself may rot and rip when you try to move it. Too much of a good thing is never right either, and storage in a very dry place will result in a big loss of moisture from the wool, which in turn means a loss of weight. Since wool is sold by the pound, that lost water is money out of your pocket. Wool that is stored on the ground floor of an unheated building will retain a suitable amount of natural moisture, especially if the pile of wool bags is covered with a tarp to keep dust off. Never store wool in a heated building in winter unless you are willing to accept weight losses of 20 percent and up. Also, keep the larceny in your soul under control and don't be tempted to turn a hose on the bags or leave them in the rain on the day before selling. I know a fellow who does that sort of thing, and he has the respect of nobody.

If stored properly, wool can be kept for a long time, and many people stash it away to wait for the right price. If you do this, remember that wool in storage gathers no interest, so don't let your stubbornness cheat you out of the best total price for your wool. If you are selling wool to handspinners, never keep it for longer than six to eight months. The so-called yolk in the wool (a combination of lanolin, sweat, and dirt) will gradually harden with time until the wool is very difficult to spin without first washing it. Many spinners prefer to spin unwashed wool—this is called spinning in the grease—and your wool will not be satisfactory if it is old and dried out. Sell old fleeces along with your commercial wool, and don't ruin your reputation by trying to palm them off on a handspinner. The current trend among handspinners is to wash wool before spinning, or even to send it to a professional for processing. You may want to investigate having your wool processed before you sell it.

During shearing, be sure to handle the ewes gently and avoid crowding them. We have sheared ewes on the day before they lambled with no problems, but be easy with them. If you use chutes, be sure they are just wide enough for one ewe so that two don't try to crowd side by side. Avoid moving the ewes through narrow doorways or gates, and avoid having the flock make a turn just after they go through a gate or a doorway. The flock will always crowd toward the inside of the turn: pity the poor ewe who is caught against a fence post or door jamb. If a turn is unavoidable, post a person or a dog at the inside of the turn so the flock will shy away a bit. Avoid using a dog to herd ewes in late gestation unless the dog is trained to hang well back and not crowd the flock together. Be sure there is plenty of space at feeders. A feeder that gave plenty of room during early gestation will be mighty crowded when all of the girls are full of twins and triplets, although shearing does help the space problem considerably.

Cautions: If you have a flock of mixed white and colored sheep, be sure to shear the white ones first, so you don't contaminate the white fleeces with black fibers. For sanitary reasons, be sure to try to avoid shearing any sheep with abscesses until last. If an abscess is cut open, do not use the cob and cutter again until it is washed with lots of soap and water. Otherwise you could spread CL through cuts from shearing. See chapter 6 for some information about CL.

Chemical Shearing

There is a product used in Australia called Bioclip that is a synthetic version of the natural chemical that causes sheep to shed their wool. This shearing without shearing sounds appealing, but it has its complications, not the least of which is that the chemical is not approved for use in the United States. To use Bioclip the sheep must first have all dirty and stained parts removed by conventional shearing, then it is enclosed in a big “sweater” to keep the fleece together, then the chemical is given, and soon after the wool starts to come loose from the sheep. The sweater and wool cannot be removed immediately, because the sheep is totally without wool cover, and would suffer exposure, sunburn, insect attack and the like. This “easy” way is not as easy as it sounds. Not only that, it is suitable only for very fine-woolled sheep.

MEDICAL

Late gestation is the time to give the ewes a booster vaccination against *Clostridium perfringens* types C and D. This will be the second vaccination for replacement ewes and the annual booster for the older residents of the flock. The booster increases the number of antibodies in the ewe’s blood that are specific against *Cl. perfringens* and the toxins it produces. A veterinarian would say that the titer of the antibody was increased. The reason that the titer should be increased now is not for the ewe but for the lamb-to-be. Antibodies are large protein molecules that are able to attach themselves to bacteria and toxins produced by bacteria and by so doing render the toxins harmless and the bacteria easier for defensive cells to destroy. The vaccination causes the ewe to produce an antibody that is tailor-made to defend against *Cl. perfringens*. This antibody is then passed to the lamb through the colostrum and gives the lamb temporary immunity.

For exactly the same reason, to increase antibody titers, ewes can be given booster vaccinations against other pathogenic organisms that might adversely affect lambs. Examples are vaccines against tetanus, sore mouth, or parainfluenza-3 (PI-3) virus. This is not to say that every shepherd should vaccinate against these diseases.

Tetanus is a rare problem in some areas and with certain management practices. Sore-mouth virus is not present in some flocks and should not be introduced. If you do vaccinate against sore mouth at this time, do it only if

all ewes are immune, either from previous vaccination or from having had the disease. The reason for this is that an unprotected ewe will get the disease, and the virus will be spread around the area from the scab formed at the vaccination site, so there will likely be lots of infective material around to transmit the disease to the lambs later. On the other hand, you would like to raise the titer of sore-mouth-specific antibody in the ewe's colostrum to protect the lambs. As you can see, you are caught between the proverbial rock and a hard place. There is no simple answer to this dilemma: you might want to talk to your vet or toss a coin, or both. The goal is not to vaccinate once all sheep are immune, then lambs are protected by colostrum.

There is no treatment that will cure sore mouth. However, on the basis of a comment by animal nutritionist Dr. William MacDonald of California, there have been a number of informal trials of using injectable vitamin B12 applied topically to the scabs (lesions), including one done by a veterinarian with several hundreds of lambs in Mexico. The treatment is very effective. It does not shorten the course of the disease, but the scabs and discomfort are greatly reduced, and the possibility of secondary infection is cut drastically.

If you have experienced pneumonia in lambs during previous lambings, vaccination against the PI-3 virus is probably in order. Vaccination of previously unvaccinated ewes with the injectable vaccine is not appropriate because it causes a general infection or viremia and can cause abortion. The nasal vaccine, especially with previously vaccinated ewes, seems to pose little or no danger. The PI-3 vaccine is not of proven value with sheep, but clinical tests by practicing veterinarians suggest that it is of some value.

However, don't get vaccination-happy and spend a lot of time and money trying to immunize your flock against every known disease. Vaccines are not without dangerous—even lethal—side effects under some conditions. Discuss your whole vaccination and preventive health program with your veterinarian to devise a policy that best fits your flock.

If the ewes were not wormed at mid-gestation, they should be wormed at this time. The previously dormant worms become very active just before and after lambing and will undergo a rapid population expansion if not treated; this will result in poor ewe health and transmission of large numbers of worms to the lambs as well. According to Rupert Herd of Ohio State University, worming is most effective if done in the two weeks just prior to lambing, although it is almost as effective when done immediately after the birth

of the lambs, especially if the ewe is penned away from a pasture for twenty-four hours or more.

FLOCK OBSERVATIONS

Late gestation is the time when flock observations are very important. During some other parts of the ewe's cycle you may be able to get away without watching the flock frequently, but not now.

Abortions

Look carefully for ewes who are ready to abort or who have done so. Send fetuses and tissue to a lab for examination, and cross your fingers. If a number of abortions occur, you should react with some sort of treatment. If vibriosis is a possibility you can feed 250 mg of Aureomycin crumbles per head per day in the feed when an outbreak starts. Some causes of abortions such as enzootic abortion or listeriosis are untreatable at present. Be sure the flock is adequately fed, because malnutrition can cause abortions too.

Prolapses

As the ewes become more and more filled by the enlarging lamb, placenta, and other tissues and fluids, there is less and less space for everything. As a result parts of the vagina or rectum or both may push out (prolapse); this is sometimes called eversion of the vagina or rectum. This condition is serious because the exposed tissues can become dirty, frozen, cut, sunburned, and infected. Continued exposure can result in death of the lambs and ewe. The only solution is to try to get the exposed tissues back in place and hold them there. If the prolapse only appears when the ewe sits or lies in certain positions, but goes back in when she stands, treatment may be put off, but watch her carefully.

If a big, red, grapefruit-sized mass appears and stays out, something must be done. There are little plastic gadgets on the market called ewe-bearing retainers that are inserted into the vagina after the tissue is replaced. The retainer is positioned on the cervix and held in place by tying it to the wool or by stitching it to the skin of a shorn ewe. Some people claim to have good luck with these or with homemade versions, but I think that they are a waste of time for all but the least serious cases of vaginal prolapse. The reason they don't work is that the ewe strains and pushes and flips out the vagina again,

plastic gadget and all. For similar reasons, stitching the vulva closed to keep everything in is not very satisfactory.

The method we like is one suggested by Joseph Rook, extension veterinarian at Michigan State University. It involves making a harness for the ewe. You'll need four or five pieces of baler twine tied together into one long continuous piece (see, there *is* a use for old baler twine!). Place the middle of the twine over the top of the ewe's neck and let the two halves hang down on each side. Cross the two ends over the brisket. Then bring them up under the two "armpits" and up the flanks. Cross them again over the spine just rearward of the last rib and then run them under the rear "legpits," between the thigh and the udder. Then bring them up and over the rear end, one twine on each side of the vulva and tail, and then forward to the original twine over the back of the neck, looping the two free ends under the original piece and tying them temporarily. Clean the prolapsed tissue with warm water and mild soap and push it back in place. It helps to elevate the ewe's hind end when doing this. Have a helper hold her hind legs up on a bale of straw or face her downhill. If the ewe pushes the tissue back out almost as soon as you replace it, have a helper hold onto her tongue using a towel or a cotton glove to get a good grip, and pull on it. When her tongue is pulled, she can't strain, at least not as much.

If you are alone, this procedure can still be followed. Loop a double length of twine over your neck and tie the ends to the ewe's two rear hooves. Now stand up. This lifts the ewe's hind feet off the ground while she carries most of her weight on her front legs. (If she rolls over on her spine, then you have to carry her weight on your neck, which isn't nearly as easy.) With her rump in the air, the prolapsed mass will generally pop back in of its own accord.

If all else fails, pour granulated sugar over the moist mass; this will help to shrink it down to the point where it may fit in more easily.

Assuming that you have gotten the vagina back in by some method, now back to the harness. Tie some short pieces of twine between the two strands that pass either side of the vulva, one at the top of the vulva and one at the bottom. You also can tie a piece across the top of the tail. Then the whole harness is tightened by taking up slack where the two free ends were temporarily tied to the piece across the neck. The harness should be so tight that the ewe can barely walk. She may even fall over sideways at first, but set her up on her feet, and she'll learn to walk with it on after a few minutes. The idea of this harness is that the short twines across the vulva keep the tissues in place, and

the tight harness prevents the ewe from humping her back and straining. Putting on the harness is much more complicated to read about than it is to do, and you will find that you can do it quickly, even alone, after a couple of tries. The harness really works, and most other methods don't.

Small lambs can be delivered right through the harness. For larger ones the cross-twines can be cut or moved and the harness loosened somewhat. Needless to say, the shepherd should make every effort to be present at lambing of a trussed-up ewe. Some ewes will have vaginal prolapses as lambs or yearlings, then never have one again as they grow bigger and have more room inside. An older ewe that prolapses or one that does it twice should be culled. The tendency to prolapse seems to be heritable so don't keep replacements out of ewes who have prolapsed.

Some ewes bred as lambs may be so small that they cannot make room for twins or triplets and may prolapse both the vagina and the rectum. Harnessing is helpful, but the best solution is to get the lambs out of the ewe as soon as possible. If the ewe is valuable, or if her lambs are expected to be of greater than average value, it may be economically reasonable to take the lambs by Cesarean (C) section. Check with your veterinarian as to cost because the charge for a C-section seems to range widely from vet to vet.

If the ewe is due to lamb within less than four days, lambing can be induced by use of appropriate chemicals. We have used dexamethasone for inducing labor with good results. An injection of 4 cc is given, and the ewe should lamb within thirty-six hours. If she doesn't lamb, repeat doses can be given every twenty-four hours until she does lamb. Other chemicals are also used, such as flumethasone at the rate of 2 mg per injection, according to Dr. A. L. Slyter of South Dakota State University. Be sure to consult with your veterinarian before using these biologically potent compounds, because you might create more problems than you solve. One important consideration is that both of these compounds suppress the ewe's immune system, so she is less competent to fight off infections.

Acidosis

Various digestive and metabolic disorders can crop up during late gestation. Some ewes, especially older ones, may have trouble adjusting to the increased amount of grain in their diets and may respond by getting acidosis. Treat them with baking soda and diet restrictions, as described in the chapter on flushing. I don't mean to pass over acidosis lightly, as it can be fatal. Watch

any ewe who is off her feed after having eaten heavily the day before and any ewe who got into some extra feed somehow.

Ketosis

Another disease that can affect ewes during late gestation is ketosis, sometimes called pregnancy toxemia or twin lamb disease, the latter name coming from the fact that ewes carrying more than one lamb are most often afflicted. The usual first symptom is going off feed, as with acidosis, but the similarity ends there. As the disease progresses, the ewe will stagger, look glassy eyed, may circle, lean her head against objects like fence posts, and may elevate her head. Then she becomes weak, lies down on her chest, becomes comatose, and dies. Thin or fat ewes are the ones most usually affected. The breath smells of ketones, like nail polish remover. The presence of ketones in the urine is also a symptom and can be detected using test papers or powders that your veterinarian can supply to you. Collecting a urine sample is easy. Have someone hold the ewe's nostrils closed to prevent breathing. Her reaction usually is to urinate, so be ready to collect a sample.

Ketosis will rarely affect a ewe that is being fed adequately during late pregnancy because the disease results from mobilization of the ewe's own body fat to provide energy for the growth of the fetus. The ketones that poison the ewe are a harmful by-product of the fat mobilization. Some fat ewes will develop ketosis even with adequate feed so it is very important that ewes enter late gestation in good condition without being obese. This is one of the reasons to let the ewes lose some weight during early gestation so that they can be on a weight-gaining feed level when rapid fetal growth demands its share of nutrition.

Even if the shepherd provides what should be enough nutrition, some ewes likely will come down with ketosis. They will usually be those carrying triplets or who don't compete well at the feed trough. Watch for early signs and isolate any ewes who are acting distracted or staggering a bit. The urine test is not completely foolproof, but it can catch some early cases. Treatment of ketosis is usually not very effective. There are gallon bottles of so-called ketosis cures that consist of propylene glycol to be administered as a drench. The energy provided by this material will relieve symptoms for a while, but the symptoms recur as soon as the propylene glycol is metabolized because the unborn lambs are still demanding nutrition. Glucose can be administered as a solution injected intravenously or subcutaneously along with the first

drench of the propylene glycol. Be sure not to use ethylene glycol, which is automotive antifreeze and is very toxic.

The only cure once the disease has progressed very far is removal of the lambs. In the early stages, and if the ewe is near full term, the lambing can be chemically induced. If the ewe has already gone down, there is not time to wait for the inducing to work and only a Cesarean-section removal of the lambs will save the ewe. With luck, ewe and lambs can be saved, though of course all can be lost too. You'll have to judge whether the ewe and lambs are worth the cost of the vet's doing the job. Unless the ewe is too far gone, she will recover promptly when the lambs are removed. Consider that the lambs may well be orphans even if the ewe recovers, because the ewe may have no milk or may reject the lambs. In any case, be prepared to give the lambs care, because the veterinarian will be busy with the surgery. Have some colostrum ready to give the newborns for their first meal.

If the ewe is in terminal stages, you may also choose to take the lambs yourself. Make an incision down the midline, locate the uterus, and get the lambs out any way you can. Some people say they shoot the ewe before making the incision. This gives the lambs less of a chance, in my opinion, and I'd opt to get the lambs out while the ewe is still alive. If you are sacrificing the ewe, she is presumably comatose and won't feel a thing anyway. We have attempted this emergency operation only once, and the ewe died before we could get a scalpel so we lost the lambs. It is a grim business, especially with a favorite, but after all you *are* trying to save her lambs.

Milk Fever

Another metabolic disease that can strike around lambing time is milk fever or hypocalcemia, a familiar and worrisome condition to dairy people. The name "milk fever" is a misnomer because fever is not a symptom. Rather, the ewe becomes stiff and uncoordinated, sometimes with a spraddled stance. Tremors, weakness, wide "worried" eyes, and rapid breathing follow. Then the ewe may go down with head forward and legs back. Coma, paralysis, and death soon follow.

The cause of milk fever is a low calcium level in the blood. This does not mean that the diet has insufficient calcium. In fact, high calcium in the diet can actually lower blood calcium levels. Treatment consists of intravenous injection of calcium in the form of calcium gluconate, usually with some magnesium and glucose and other things added. This IV calcium should be

administered by a veterinarian until you learn the technique because a too fast administration can cause a heart attack and kill the patient. If milk fever is a common problem, ask your veterinarian to teach you how to monitor the heartbeat and administer the IV solution correctly. The calcium solution can be given subcute in a number of sites, about 10 cc per site. Alternately, the whole dose, usually a rather large amount, can be given intraperitoneally. A needle is inserted into the center of the triangular area bounded by the spine, the last rib, and the hipbone on the right side of the animal. The needle is inserted slowly so that it punctures the skin and enters the peritoneum but pushes the intestine out of the way. Get your vet to show you this triangular hollow so you really will know what you are doing. Either the subcute or the intraperitoneal (IP) injection is much less desirable than the IV because the solution is very irritating to the tissues. The causes of milk fever are not really well understood. Happily, it is not at all common in sheep compared to dairy cows. Keeping the sheep supplied with adequate salt seems to be a worthwhile preventive measure.

Bag Development

Normally, the udder of the ewe will begin to enlarge and the teats become more erect as lambing approaches. Some ewes will “bag up” weeks before lambing, whereas others will not do so until just a few days prior to lambing time. This characteristic varies with the individual ewe, of course, but it may also tell you something about the unborn lamb or lambs. The hormonal signals that trigger bag enlargement come from the lamb. Because of this, it may be that the ewe who has a good milk supply does so partly because the ram that bred her passed on genes to the lamb that made it send a big dose of bag-promoting hormones to the ewe. Scientists studying dairy cow records discovered that a dairy farmer can increase milk production from the cows by using bulls who sire calves that cause big bag development. There is no reason sheep raisers should not do the same.

Ordinarily, the ewe will have no problems associated with the enlargement of her bag, but this is not always so. If a heavy milker gets too engorged prior to lambing, milk her out. Save the colostrum because she may not have enough of it when the time for lambing comes. Mastitis-prone ewes can be fed Aureomycin crumbles with their feed at the rate recommended on the bag for a week before and a week after lambing.

Some ewes who have had mastitis previously will have their bag enlarge to

LATE GESTATION

an alarming size before lambing. One year a ewe who had lost one side of her bag the year before had her bag swell so much that it dragged on the ground and was cold to the touch. We were just getting ready to sacrifice her and save the lambs when she went into labor and had beautiful twins. Her bag quickly went down, and she raised one of the lambs herself.

Generally, bagging up is just a normal sign of impending lambing. Just before lambing, as much as thirty-six hours before, the bag may be hot to the touch. This is also normal, and is one of the clues that lambs are on the way.

EVALUATION

Make a list of the ewes that prolapsed, had milk fever, ketosis, or acidosis. Any ewes that are repeat offenders for these problems should be considered as prime candidates for the truck. Except for prolapses, you should consider whether the shepherd was at least partly to blame. Either change the sheep or the shepherd.