



7

LACTATION

A ewe is in the business of producing wool and lambs, a job she does with remarkable efficiency. Her body is a factory that grows protein, fats, and bone on a year-round basis. Over the course of a year she will grow about ten pounds (up to twice that and more for some breeds) of essentially pure protein in the form of wool, probably the first fiber ever used by man for clothing and still the best in my unbiased opinion. This miracle fiber is coated with a soluble fat called lanolin that is a component of costly women's cosmetics and healing salves. One has only to shake hands with a sheep shearer after a day's work to find out what wonders lanolin can do for skin.

Still, for most growers, it is the production of lambs that is the ewe's major function in terms of cash value. This process is not spread over the year as is wool growth, but starts slowly after conception, then increases towards the end of gestation, and finally, after five months, produces lambs that generally weigh up to ten pounds or so each. Then the ewe's work really begins in earnest. While she has taken months to make ten-pound lambs, now she is going to give milk to those lambs at such a rate that some of them will

increase in weight more than a pound a day, which means that some can weigh over a hundred pounds when they are weaned at ninety days of age.

This amazing ewe is going to eat hay and grain or some other simple feed and convert it into nourishing milk that not only grows lambs like crazy, but is the basis for some of the great cheeses of the world. She is a remarkable combination of feed-conversion factory, affectionate mother, and docile friend, making shepherding as rewarding as any occupation on earth.

NUTRITION: THE EWES

As one might expect, a ewe's nutritional needs are very high during lactation. These needs are so large that many ewes simply cannot eat enough feed to milk freely and still maintain their body weight, and a weight loss during lactation is the rule rather than the exception. A big milk producer that is suckling twins or triplets can be expected to come out of lactation with her ribs and hipbones pretty prominent.

The fact that a weight loss is to be expected should not be used as an excuse to withhold adequate feed. A lactating ewe with a single lamb will need the equivalent of about two pounds of shelled corn and four to four-and-a-half pounds of high-quality hay per day. If twins or triplets are being supplied, then even more feed should be given, as shown in the NRC tables in appendix 5.

A ewe can produce milk on lush pasture almost as well as she can on a grain-hay diet, but the shepherd should realize that many of our popular modern breeds of sheep are bred for farm flocks, and they will not do as well on grass alone as they will with some concentrate supplied. If good pasture is available, it should be utilized, but the shepherd will still find that some added grain will more than repay its cost with increased growth for lambs.

If hay is being fed during lactation, it should be the best hay of the year. As any dairy farmer will tell you, milk production is very sensitive to the quality of the hay fed, and top yield will come from the leafy, soft stuff with the highest protein and digestibility. You should have fed your poorest hay during early gestation and gradually improved your offering to reach a gourmet quality at this point.

If you simply don't have any excellent hay, you will still have to provide sufficient protein for milk manufacture. Let's face it, lots of us run out of hay

from the previous year just about the time we need that good stuff for the lactators. In such an event, sit down with pencil and paper and the NRC tables and figure out what diet can be used. With lower quality hay plus grain, you will probably find that the total diet is short of protein. It can be added in the form of soybean meal or some other high-protein additive. The ewes may or may not need the extra protein for basic survival and health, but they surely will milk better in both quantity and quality. Don't try to save a few dollars on feed during lactation: your stinginess will be repaid with stunted lambs that will require far more feed later to reach market weight and finish. A lamb has its maximum growth potential during the early part of its life, and the goal of the shepherd should be to take advantage of the highly efficient feed conversion of young lambs. One way to do that is to feed the ewes well.

In addition to top-quality hay and adequate grain, the ewes will need plenty of fresh water, more than at any other time in their cycle. It is obvious that milk is mostly water, so the ewes need it for that reason alone. Equally important, the ewes are consuming a lot of dry feed, and they need water to keep the rumen contents suitably wet for the hard-working microorganisms that are doing the digestion job for their woolly host. Moreover, the ewe who is not getting enough water will limit her feed intake and will not produce milk as well.

Just providing the water is important, but encouraging the ewes to drink it is also beneficial. The easiest way to make ewes drink more water is to make them thirsty by giving them plenty of salt, just as a bartender sells a lot more beer by giving away free pretzels and popcorn. Salt can be made available free choice near the water and should be mixed half-and-half with dical to give additional calcium and phosphorus that is used in making milk. A sheep mineral mix can be used too, to provide the salt and dical plus trace minerals such as selenium and cobalt. If you wish, some plain salt (not trace mineral salt that contains copper) can be added to the grain at a rate of about 0.5 percent to 1 percent.

The lactating ewe's need for salt has been demonstrated by some fascinating studies by Australian veterinarian Derek Denton (*Hunger for Salt*, Springer-Verlag, 1982). Denton found that sheep have internal controls that keep the sodium content of their milk at a precisely constant level. The consequence of this is that if the sheep gets insufficient sodium in its feed, water, and supplements, it will first draw on body reserves, then, when those are gone, the ewe will produce less milk in order to keep the sodium level

constant. Therefore, the shepherd must be very sure that lactating ewes have all the salt they want, because if they don't their milk production will decrease. It's basic: no salt, no milk — or at least greatly reduced milk, because feeds such as grasses and corn contain very low levels of sodium.

Many sheep raisers add monensin to ewe rations during lactation. It is added for two reasons. One is to suppress the growth of the internal parasites called coccidia, mainly to reduce the incidence of infection in the lambs, and some producers and veterinarians swear by it for this purpose alone. Monensin also affects the rumen microflora, causing an increase in the species that make the fatty acids, which are ultimately made into protein, at the expense of those that make fats. A typical rate of monensin in feed is about ten grams per ton. Do remember, as I have mentioned elsewhere, that monensin in feed is not approved for sheep, and is also highly toxic in even slightly excessive dosage.

NUTRITION: THE LAMBS

The feeding of young lambs is something no two shepherds do exactly alike. There is a sort of continuum from those who just let the lambs run with the mothers to nurse and eat whatever turns up, to those who manage the lambs more intensively by providing nutritious and palatable solid food along with the ewe's milk almost from the beginning.

The principal difficulty with letting the lambs tag along after their mothers as in the children's books is that this sylvan scene invites poor nutrition because of competition for food, principally from worms. Unless the ewe flock is totally worm free, and that is pretty much impossible, the lambs will quickly get infested, will grow poorly, and some may even die. However, if the ewes are treated with a wormer at lambing, and the pasture was clean, it will take some weeks for the lambs to become really wormy. At that time, worming the lambs is futile as long as they pasture with the ewes because the worms will just infest them again.

I cannot recommend that lambs be allowed to run with the ewes in intensively grazed pastures. If the stocking rates are low, grazing of lambs with ewes is more practical. This is especially true in range grazing where the flock is on the move, so that by the time oocysts hatch to larvae, the sheep and lambs have moved on to clean ground.

Creep Feeding

A solution to this problem is to provide a separate place for the lambs to eat so that they do not have the opportunity to ingest worm larvae. The lambs can be put in a pasture of their own, but this is easier said than done. What is more practical is to have a so-called creep area, a place where they can go to eat, but the ewes can't. They should have been preconditioned to a creep area by having been provided such a place adjacent to the community pens where they were moved soon after lambing.

One can arrange paddocks, yards, and the like so the lambs have access to the ewes for nursing, but don't go out to pasture with the ewes. While the ewes are on pasture, the lambs can eat in their creep area.

A creep area is a place that is fenced off by a partition that has vertical slots about eight or nine inches apart that allow lambs to squeeze through but exclude ewes. A horizontal space about a foot high will work too. The exact dimensions depend on the size of your sheep so you may have to do a little experimenting. The creep area should be dry, light, free from drafts, and generally pleasant, to make it as attractive as possible to the lambs.

Creep Feed

Creep feed, the name given to feed provided to lambs in the creep area, should be available in the creep at all times, and it should be fresh and palatable. Leafy hay is always of interest to lambs, so have some of that. For best growth, they should have a grain mixture of some sort. Finding out what lambs like to eat as early solid food is a matter of trying different things, but studies at the University of Illinois suggest some guidelines.

Soybean meal is a clear favorite of the Illinois lambs, perhaps reflecting a patriotic attitude, further supported by their high preference for corn, that state's other big cash crop. Some shepherds offer straight, undiluted soybean meal as the creep feed for very young lambs, and some lambs consume it eagerly. We have tried straight soybean meal, and found that our lambs were not especially fond of it, preferring coarsely milled corn. Experimentation is the answer, in my opinion, but a soybean meal, corn, bran, and sweetener mixture would be a good starting point. Any creep feed mixture can be improved nutritionally by adding 0.5 percent salt and 1 percent ground limestone, as well as a vitamin premix that provides 1,000 IU per pound of vitamin A and 200 IU per pound of vitamin D. If you are a believer in adding antibiotics to feed, chlortetracycline (Aureomycin) can be added at a rate of 50 mg/lb. (100

Table 2 Feed Consumed in a Two-week Period (in pounds)

Weeks	1-2	3-4	5-6	7-8	9-10
Oat groats	0.00	0.05	0.88	1.02	1.43
Whole oats	0.12	0.29	1.46	1.65	1.25
Shell corn	0.11	0.30	2.77	7.83	8.02
Alfalfa hay	0.23	0.41	1.43	1.12	1.05
Alfalfa pellets	0.00	0.14	1.35	4.06	1.98
Wheat bran	0.27	0.55	2.01	3.17	1.08
Soybean meal	0.81	1.70	6.94	11.01	10.63
Linseed meal	0.03	0.12	0.72	1.06	0.65
Linseed pellets	0.00	0.02	0.65	2.62	3.51
Sweet pellets	0.27	0.75	3.54	4.08	2.19

Source: "Young Lamb Nutrition and Management," Robert M. Jordan, University of Minnesota, 1975.

g/ton). If white-muscle disease has been a problem, consider adding selenium and vitamin E as well.

Feed companies offer creep feeds in pelleted form that provide convenience, at a price. These feeds are made of the same materials you can mix yourself or have mixed for you at a grain elevator. They will cost you about 30 to 40 percent more than homemade mixtures, with little or no improvement in lamb growth. Pelleted feeds are somewhat more palatable to lambs than ground ones, but if the grains are ground coarsely, the lambs will eat ground feeds almost as well as pellets. It is important with any kind of lamb's feed to be sure that it is fresh. Whether provided in troughs or in self-feeders, be sure to clean out the old feed each day or oftener and feed it to the ewes, giving the lambs fresh feed. Remember that it is in your interest to have the lambs eat as much as they will, so cater to their picky tastes.

You may want to add monensin to the lamb's feed. It is not approved as a feed additive for lambs, so your vet cannot prescribe it for off-label use. Studies conducted at the University of Saskatchewan by Dr. Glyn M. J. Horton showed that monensin improved lambs' performance in almost every respect. At a level of ten grams per ton of feed, lambs gained more weight than other groups receiving more or less monensin. Not only that, they made their greater daily weight gains on fewer pounds of feed for each pound of gain. In addi-

tion, the lambs grew as well on a 13 percent protein ration as they would have done on a 15 percent protein ration without the monensin. All of this from a feed additive that controls coccidiosis as well. One would hope that monensin will be formally approved for sheep someday, but that is unlikely. Adding both Aureomycin and monensin to feed appears to be irritating to the lamb's digestive tract, so avoid that combination.

Bottle Lambs

It is a rare sheep operation that doesn't generate some bottle lambs. A fortunate shepherd may be able to graft all the extras onto ewes with singles, but most of us aren't that lucky. Actually, having some bottle lambs is probably an indication of a good flock and good management, because it may mean that the ewes had a lot of triplets. For whatever reason, the lambs are valuable, and should be taken care of. If laziness or lack of time demand it, the lambs can be sold as bottle lambs. There are always a few people around who will pay for orphans and raise them as pets or for slaughter lambs. These people are willing to pay from nothing up to a premium price, so you might want to test the market with an ad in the paper or on a radio trading program that small-town stations commonly have.

Lambs with poor-milking mothers can be supplemented, but they will generally do better if pulled off mom altogether. Lambs on a bottle are fine if you like to do it, but a self-feeder as described in the last chapter is a lot less work, and lambs generally grow better, too. There is also the consideration that hand-fed lambs grow up to be tame pet sheep who aren't very afraid of you. If one of those lambs happens to grow up into a 300-pound ram, his lack of fear of you may be a real problem when he decides to get playful.

I have already mentioned that a lamb milk replacer is the best substitute, nutritionally at least, for ewe's milk. It or any other substitute, including cow or goat milk, is pretty expensive, and the goal should be to get the bottle lambs weaned to solid food as soon as possible. They should be weaned no later than six weeks of age, and researchers at Agriculture Canada's Animal Research Institute have found that weaning at three weeks is most cost effective. Get those lambs onto solid food soon, because every day they are on a milk replacer means you are losing money. Make every effort to give them the food they like and get them chewing and ruminating.

HANDLING

Much of the handling of lambs during lactation involves training them to get along without their mother. Most lambs will be very attached to their mothers, but the clever shepherd should be planning ahead for the day when the lamb will be permanently separated from his dam. One of the best ways to weaken the maternal bond a little bit is to give the lambs a pleasant place to get away from their mothers and into the company of their peers. Such a place is the creep area, although even if it is set up with feed, water, shade, soft bedding, and everything short of a color TV and a rack of comic books, some lambs simply will not voluntarily go to the creep, preferring the woolly familiarity of mother. To get those apron stringers used to the creep area, they must be forcibly put into it often enough to give them the idea that it is not such a bad place after all. You will find that lambs learn to eat grain by their mothers' sides very early in life, even at just a few days old. All you have to do is try to convince them that the grain in their creep area is just as good or better.

We use a creep area that adjoins the area where we feed the lactating ewes their daily grain ration. Both ewes and lambs enter the feed area through the same gate, but the ewes have to make a right turn to get to the grain troughs. The lambs' creep entrance is straight ahead, so in the mad rush many of the lambs simply fail to make the turn and head unswervingly into the creep area. A lot of the lambs turn with the ewes, of course, so while the ewes are oblivious to their surroundings in their intense concentration on eating, we go through their area and shoo the rest of the lambs into the creep. After a couple of weeks of this, most of the lambs are trained to go into the creep without urging. There are always a few who duck and dodge and have to be pointed in the right direction, but that keeps life interesting. Once all of the lambs are in the creep we leave them closed in there for a while so they can discover that it really is a lot more pleasant than out in the dry, dusty feedlot.

Another way to separate lambs and ewes is to make the ewes leap a low barrier that is too high for the lambs. A height of about seventeen to eighteen inches seems about right. Put feed out for the ewes and open a gate over the barrier. The ewes will sail over, leaving the lambs behind. The first two to three days, lambs will be in the way and get tossed around, but they quickly learn to stay back from the hurdle to avoid getting beat up by their mothers as they leave. This may sound bizarre, but it works beautifully. One year we had

a badly overweight ewe. She was too fat to be able to leap out, so she didn't get her grain and slimmed down just fine.

Lambs need various treatments for diseases, of course, and the creep area makes a handy place to capture them. The creep area is a good place to spot lambs that are doing poorly. In the company of its fellows who are gamboling about or snoozing peacefully, a droopy, dejected-looking lamb stands out like a sore thumb. Catch those lambs, find out what is ailing them, and give them appropriate treatment. This opportunity to observe and treat lambs is so valuable that I favor a creep area even if the lambs are allowed to run with their mothers. A sick lamb can easily hide behind its mother until it finally is found dead. Get them away for even a few minutes, and the ones with troubles can be spotted easily. Many sheep raisers build portable creep areas—fences on skids—that can be towed around from pasture to pasture using a tractor. Some elaborate ones even have roofs to provide shade.

In order to utilize our pastures efficiently as well as to keep the lambs from acquiring worms, we send the ewes off to pasture while the lambs are confined to the creep. This not only makes maximum use of the pastures, but it gets the ewes used to being lambless for at least part of the day. In spring the scheme is especially useful—the ewes are eager for food and can be given a whack at the first, extra-tasty grass of the year without being given the chance to overgraze the tender new cover, because they are not allowed to be there too long. Later, when the shepherd wants them back, they are satiated with lush greens, and their bags will be tight with milk so that they want to get back with their lambs in the worst way. They return with eagerness and joy.

The only trouble with this method is the noise level. When the ewes and lambs get back together, they all call for one another at the same time as they mill about trying to get the right lambs attached to the right udders. The resulting cacophony is truly unbelievable and is comparable, I think, only to one of those riots that take place at soccer matches now and then. Things settle down quickly, however, and soon nothing's to be heard except the wet quiet of all the lambs nursing at the same time, interrupted only by the slap of a nose against a bag as a lamb urges more milk out with nudges and whacks.

Weigh the lambs one or more times during lactation to check on their progress. You may want the weight information for a variety of reasons, if only to make you objective. If you don't take the time to weigh all of the lambs, at least use your eyes and pick out the ones who are not gaining and

growing along with the pack. Are they sick? Is there a triplet who is not competing for milk? Is a lamb wormy? Now is the time to find out.

MEDICAL: THE EWES

Mastitis

The bugaboo of lactation is mastitis. The shepherd must be alert for mastitis even before lambing and keep up the vigilance until after weaning. Early detection and treatment is essential because once milking capacity is lost, it never seems to return, and a ewe that cannot nurse a couple of lambs is virtually useless.

Mastitis is an inflammation of the udder caused by invasion and growth of one or more pathogenic bacteria or other infective microorganisms. In the early stages, the milk will be lumpy or have strings of material instead of being smooth. Also, a healthy udder will be soft, pliable, and elastic, without lumps or firm regions. If the udder is hard or lumpy, squirt some milk into your hand or a stripping cup (you can get these from dairy supply houses) to check it. Close to lambing, either before or after, a ewe's bag can be very firm and swollen, but the milk should look normal.

As mastitis becomes more acute the bag becomes lopsided as one side is milked out and the other is not. Lumps may be grossly visible even from a distance, and the ewe may walk painfully or limp, sometimes kicking at the udder with a hind leg. When things have gone this far, treatment is urgently needed. Remember that a ewe can come into lambing with a fully developed case of mastitis, so by lactation time things may be really out of hand.

Our veterinarian is a wise and sensible person who doesn't believe in discarding old methods just because they are old. His advice for treating mastitis is to use milking-out of the ewe as a primary treatment. Mastitis was treated this way for hundreds or thousands of years before sulfonamides and antibiotics were even dreamed of, and we should not abandon this harmless and simple treatment. The principle is elementary: milking removes excess fluids, pus, and many of the live microorganisms that are causing the problem in the first place. If milking is done frequently, the pathogens do not have as good an opportunity to increase in numbers and invade healthy tissue. Removal of the infective "bugs" helps to give the immune system a chance to get

ahead of the infection, and only that will effect the final cure. Chemical treatments can slow down an infection, but the immune system can finish them off for good. Milking-out is also useful in preventing the walling off of pockets of infection that carry the potential of later reinfection should they rupture. Milk-out as often as you can take the time to do so. Frequent milking relieves pressure and pain, and the ewe is more likely to let lambs nurse to help with the job. Milking-out a ewe with mastitis is obviously painful to her, but rapid improvement after even one milking is the reward. The use of udder balms, warm towels, and gentle massage of the bag is worthwhile too. Anti-inflammatory drugs (even aspirin at one adult-human tablet per fifty pounds of sheep given every two to four hours) may help.

Chemical therapy is also called for in our experience, in addition to milking. Our veterinarian does not recommend the use of teat infusions if milking-out is being used as treatment. He thinks that teat infusions are for farmers who are too lazy to milk the animal.

Systemic treatment does seem to be effective. We give triple sulfa boluses orally for three days and simultaneously give injections of penicillin, which we continue as needed. I don't mean to imply that this is the treatment for your ewes, but it works with whatever organisms we are fighting. Get your vet's advice or talk to area sheep raisers to find out what works for your area. A veterinarian can commonly identify the pathogenic organism from the appearance of the milk, or culture the organisms and check their susceptibility to various antibiotics. Use all of the tools at your disposal, because loss of a bag is big trouble.

Prevention of the spread of mastitis should be attempted too. Isolate the affected ewe and lambs if you can because lambs who steal milk will spread the infection from ewe to ewe. When you milk her out, do so into a container and dispose of the infected milk elsewhere. When moving an infected ewe from a pen, lime heavily and bed well before using that pen again. There are vaccines that may help, but you will need to know what organisms you are dealing with, so get a culture of some milk from affected ewes. Be warned that treatment for mastitis is usually unrewarding, so don't be discouraged if you fail to stop it—you're not the first to fail to do so.

Lactic Acidosis

Acidosis can appear during lactation as it can at any time when grain is fed heavily. Treat such cases as described in Flushing.

Grass Tetany

Ewes on lush early pasture sometimes are affected by a condition called grass tetany. Happily it is not common, but it can happen anywhere, especially in April-May. Often ewes are just found dead, but before death they walk stiffly, hold their heads upward, twitch, and are wild-eyed. They go down, paddle with the legs, and rapidly die. Grass tetany is a result of magnesium deficiency, sometimes accompanied by calcium deficiency. To treat an affected ewe, give 50–100 ml subcutaneous injections of 20 percent calcium borogluconate solution with added magnesium (often called Cal-Mag). In addition one can give subcutaneous 50 ml of 25 percent magnesium sulfate in distilled water. The above injections should be given at several sites, because of the large volume of solution.

MEDICAL: THE LAMBS

Sore Mouth

Lambs can be vaccinated very early for sore mouth if it is a recurring problem on your farm. The ewes should have been vaccinated during gestation, long enough prior to lambing that the scabs have fallen off. If the form of sore mouth present on your place is the type that makes scabs on the lips of the lambs, you can still vaccinate the lambs during lactation. This type is not too serious in any case, and will only cause lambs to go off feed for a short period as the disease runs its course.

The main danger of common sore mouth is infection of the ewe's teats. An affected ewe will not let lambs suck, and she may get mastitis as a result. Be sure ewes are protected. With well-protected ewes, vaccination of lambs is usually not needed.

There is another strain of sore mouth that primarily infects the gums and throat instead of the lips. This strain spreads more quickly than the other variety, so early vaccination is a must, preferably in the jugs. I call this a strain of sore mouth because affected lambs will not "take" a sore-mouth vaccination, implying that the antigenic signature of the virus is the same as ordinary sore mouth. The gum type is not ordinary, however. We acquired it unwittingly by bringing an infected lamb onto our place. The lamb later came down with an active case that spread to lots of our lambs before we could vaccinate them. When it appeared, we were told by the breeder that it was nothing serious. It was serious enough to cause at least two lambs to die from

starvation because they couldn't swallow. We should have been more careful. Protect your flock by not trusting anybody, even supposedly responsible breeders. Quarantine every lamb or sheep that comes into your flock.

We finally rid our flock of both kinds of sore mouth by revaccinating all ewes and by vaccinating all lambs in the jugs. One can take a chance that the flock will not be reinfected from buildings, equipment, or soil that might harbor the virus, and not revaccinate unless an outbreak occurs. Some veterinarians suggest this approach; others say to vaccinate annually. It does seem that once sore mouth has gone through the flock two or three times, either by vaccination or natural infection, it goes away to stay.

Enterotoxemia

Enterotoxemia (overeating disease) is the most important clinical problem caused by *Clostridium perfringens*, and it is generally not terribly threatening until passive immunity from colostrum wears off. The ewes must be regularly vaccinated against *Cl. perfringens* in order for the antibody levels to be high in their colostrum.

As mentioned before, early lamb scours are generally caused by these bacteria and can be halted by oral tetracyclines such as Terramycin. Another antibiotic, neomycin, is commonly added to milk-replacer formulas for prevention of scours.

Enterotoxemia from the type D strain or hemorrhagic enterotoxemia from the type C strain are both deadly to lambs. Because they are caused by excessive growth of *Cl. perfringens* from undigested carbohydrates that get into the intestine, the incidence is much higher among the lambs that eat the best. This means that the lambs that die are usually the fastest growing and healthiest looking ones.

Death is usually so rapid that the lambs are simply found dead. If lambs are observed with symptoms, they can sometimes be saved by prompt administration of antitoxin in large amounts, 10 to 20 cc per lamb. Affected lambs jump awkwardly with their hind legs, fall down and act uncoordinated, may make paddling motions with their legs, then get up again, or they may hold their heads against buildings or posts. These symptoms can be caused by other diseases that affect the nervous system, but enterotoxemia is a prime suspect in nursing lambs or those on feed. If the disease is not too far along, antitoxin will bring about prompt recovery. Take recovered lambs off feed for a few days.

We had a wether lamb one year who showed all the above symptoms and

recovered when given antitoxin. Every time we tried to return him to grain feeding, he'd get the disease again. He had been vaccinated, but apparently his immune system was not making antibodies. We finally had to raise him out on hay alone.

If ewes were not vaccinated, lambs should be vaccinated at a week of age, and again two to three weeks later. According to studies at Cornell University, if the ewes were fully immune, lambs need not be vaccinated until three to four months of age. Ewes kept for replacements should be revaccinated a month later. Feedlot operators routinely give all lambs arriving in the lot at least one vaccination on arrival.

Some producers brag that they never vaccinate for anything and never have enterotoxemia or any other disease problems. This may be, but frankly I doubt it. It is true that if lambs are never given much high-energy feed such as grain, then the likelihood of diseases like enterotoxemia is very small. But the likelihood of getting the lambs to market before they are almost yearlings is pretty small too. If you prefer to keep lambs on limited feed, and that mostly hay, you probably can get by without vaccinating against enterotoxemia, but you had better plan on selling your lambs as feeders when they reach seventy or eighty pounds.

One final note: a food technologist at the USDA Western Regional Research Center in Albany, California, has determined that it is growth of *Cl. perfringens* in the intestines that causes the familiar human reaction from eating beans. Before you are tempted to immunize yourself or someone close to you, let me remind you that an antibody circulating in the lymphatic system still won't stop the gas in the intestine, for the same reason that passive immunity in lambs doesn't do much against baby lamb scours. I suppose you could sprinkle some neomycin crumbles over your next bowl of beans, but I don't think I'll try it.

Scours

Once the lambs are out of the jugs they have generally gotten past the stage of the early scours caused by *Cl. perfringens*, although Terramycin orally can be tried for scours during the first week or so.

After the lamb has passed the first tarry feces and then the bright yellow, sticky type, it will begin to nibble on solid food. Its droppings should begin to resemble miniature versions of the pellets or berries that older ewes produce. Any departure from this should be viewed with suspicion.

If a lamb has white diarrhea, the usual cause is excessive consumption of milk, either from an overproductive ewe or from an overeager shepherd. The cure is reduction of the milk supply. If the lamb is on a bottle, just reduce the feeding amounts. If the lamb is nursing a ewe, catch her and milk her out; this will usually cut the lamb down enough to effect a cure. To really do it right, mix up some of the electrolyte solution described in chapter 5 (1 pkg fruit pectin, 1 tsp Morton Lite Salt, 2 tsp baking soda, 1 10 ½-oz. can beef consommé, and warm water to make 2 quarts). Withhold milk and feed the electrolyte solution two to three times daily until scours cease, then continue for another twenty-four hours before returning to milk.

If the scours are brown or gray, then the cause can be any one of a number of things. Coccidiosis can be controlled by monensin in the creep feed if they are eating enough of it. Worminess can also cause diarrhea, so have some fecal samples checked. Either coccidia or worms are easy for your vet to identify in feces.

If the cause is some microorganism, that is harder to treat without knowing what organism is the culprit. It is helpful to check with neighbors, area veterinarians, and others who might know what the local causes of sheep scours usually are. Otherwise, it is a matter of you and a vet experimenting to find what antibiotic might control the problem. You need only look at a catalog of veterinary supplies and see how many scours remedies are offered to suspect that maybe none of them is any good or else there wouldn't be so many different kinds for sale.

You can never do harm and you might cure the scours by administering the electrolyte solution to prevent dehydration and by also giving some mechanical bulk such as Kaopectate or Endomagma to slow things down a bit. One school of thought believes in feeding nutritious mixtures of electrolytes, powdered milk, eggs, ground grain, and the like and avoiding medication altogether, and there is considerable clinical support for this idea.

If you practice hygiene and feed your sheep correctly and still have a scours problem year after year you should seek a long-term solution. Eliminate worms or coccidia as a possible cause, then work with a diagnostic lab, your vet, an extension veterinarian, or other experts until you find the answer.

Pneumonia

If the lambs survive scours, *Cl. perfringens*, and starvation, they may still have to face pneumonia. The shepherd should recognize at the outset that

pneumonia is really a symptom and not a disease, in the sense that it cannot necessarily be traced to a single microorganism.

As I mentioned in chapter 6, vaccination with nasal PI-3 vaccine may be of some help in preventing infection by other organisms, though this is not proved. Adult sheep and lambs can also be vaccinated against bacteria called *Pasturella* and *E. coli* that are thought to be responsible for much pneumonia, and many veterinarians recommend that. Beyond those vaccines there is little that can be done by way of immunological protection. Pneumonia is brought on by a number of different organisms, and it can also be brought on by certain weather conditions. Cold, damp weather favors some outbreaks, while others seem to be triggered by dry, dusty conditions, and yet others appear in seemingly perfect weather.

Immediate treatment is essential in controlling pneumonia in lambs. At the first cough or sign of raspy breathing, give them help. Put the lamb up to your ear and listen. The breathing should sound quiet, not rough or rattling. You can feel the raspiness with your fingers or with a stethoscope if you know how to use one.

At the first signs of pneumonia, get out your syringe and needle. Only experience can guide you as to what antibiotic to use. We usually start with a penicillin, and then change to a tetracycline such as Terramycin if the penicillin produces no improvement. Some shepherds prefer tylosin (Tylan). Again, work with your vet, who can also prescribe off-label antibiotics.

As with scours, it is a matter of the individual producer's working with his or her veterinarian to recognize what pneumonia-causing organisms are present on a given farm, and learning to treat against them effectively. No matter how hard you try, some lambs will still die, especially when they are afflicted with what is called quick pneumonia, because of the rapidity of death after the first symptoms appear. To make yourself feel better, remember that there are some lambs who have defective immune systems from birth, and no amount of treatment can ever save them from an infection.

Kurt Wohlgemuth, then extension veterinarian at North Dakota State University, told a story of the time when he was a brand new vet working with an old, experienced one, treating a bunch of feedlot cattle. One day, discouraged with the high death losses, he confided his depression and lack of self confidence to his boss. According to Kurt, his boss put his feet up on his desk, puffed on his cigar a few times, and said, "Don't worry, Kurt, you can't kill them all." So when you've just hauled another dead lamb to the burning

pile or lime pit, and you're feeling pretty incompetent, remember the old vet's words, and take heart.

Aspirin

Some of the lambs that look sick may just feel bad enough to lose their appetite, and their major problem might simply be lack of food. They will not be able to fight disease if they lack nutrition. What they need is rest, good food, plenty of liquids, and an aspirin. Yes, they need an aspirin just as you do when you feel crummy, or as your child does when it has a cold or the flu. The liquid that lambs need is fresh, warm ewe's milk, but they won't start drinking it if they don't feel good. Give a lamb a baby aspirin or half an adult aspirin. In many cases you'll see them brighten up appreciably and start to eat again. If they can be kept eating, that is half the battle. Get into the habit of carrying a bottle of children's aspirin in your pocket so you can pop a tablet into a droopy lamb when you see one. It really works. If you are nervous about putting a pill down a lamb, dissolve the aspirin in a little water and use the solution as a drench. You should use real aspirin and not the substitutes mostly used for children these days.

Necropsy

When all of your amateur efforts and even the professional treatment of your veterinarian fail to save a sick lamb, don't quit even after the lamb is dead. Use the dead one to help you save live ones. You can send the body off to a veterinary diagnostic laboratory for a complete necropsy including examination of all the tissues, culturing of the material to identify bacteria, and so on. If you are having a lot of necropsies done, the costs can begin to mount up, and you may be tempted to save the fee by just disposing of the dead lamb. Don't do that until you have cut it open yourself to see what you can figure out. If you have no confidence in your own diagnostic ability, ask your vet to let you watch the job done professionally. Most vets will be glad to show you how and give you instructions in basic sheep anatomy as they go along. If your vet won't show you, find one who will, or locate an experienced and competent sheep raiser to show you what to look for. If nothing else, do it yourself and simply use your eyes. After you have cut open a few lambs you will begin to have a feel for what is normal and what isn't. Once you begin to notice things, then you are ready to look up descriptions of lesions in books or describe details to your veterinarian over the phone that will help him or her to make an educated guess at a diagnosis. All you need is a sharp knife (a disposable

scalpel is better) and possibly some pruning shears to cut through ribs. With the lamb lying on its right side, cut the skin under the left front leg and fold the leg over the back of the lamb. Then extend the cut back to the hip. Cut through the rib cartilage and then fold the left rib cage back, breaking the ribs where they join the spine. Now the belly cavity is exposed for checking.

A stillborn lamb will have dark uninflated lungs, and the kidneys will have yellow fat over them. There will also be a covering of yellow fat over the ribs and chest muscles.

With young lambs you should be able to diagnose some of the common causes of death pretty easily. With type-C enterotoxemia the intestine will be bright red from bleeding. If a lamb died of starvation, its stomach and intestine will be empty (A nursing lamb will have a stomach full of curdled milk.). Also there will be no fat around the kidneys or on the ribs and rib muscles, it having been used up for energy. The kidneys will be dark colored too. Some lambs die of impaction of the digestive tract by dirt or dry feed, and the intestines will be empty beyond the point of blockage.

A lamb that died of pneumonia will have dark, bruised-looking patches on the otherwise pale pink lungs. The dark parts will be toward the bottom front part of the lamb, with normal pink color to the top and rear of the lamb. Don't confuse that with dark parts of the lung that were down when the lamb died and blood drained into that part.

Now and then you'll find one that looks perfect to your untrained eye, but then remember that such is the case for many lambs that a trained veterinarian examines too. Keep in mind that a dead lamb is still making you money if it tells you something about lamb deaths.

OBSERVATIONS

Lactation is a time to make lots of observations, both of ewes and of lambs, but particularly of the lambs. You will have no trouble spotting scouring lambs, and one that is coughing is a candidate for pneumonia treatment. Keep your ear tuned for coughs, and if you hear one, find out which lamb did it, and treat it.

Starvation

A very important thing to be looking for is starving lambs. You might think that this sounds silly, but a survey of sick and dead lambs examined by the

veterinary diagnostic lab at South Dakota State University in Brookings showed that the major cause of death of young lambs is starvation. If you are thinking that there is no excuse for that, I couldn't agree more.

The cure for starvation is food, and diagnosis is made by spending some time each day looking at the lambs, carefully. A starving lamb will be weak, humped up if standing, have sunken eyes and droopy ears, and just not look well in general. It will also not weigh very much. Pick one up and it will not feel hefty. Its stomach will not feel full to the touch. When you find a lamb like this, check its identifying number, and go find its mother. Check the ewe's bag to see that she is really producing milk and try to get the lamb to suck if she is. She may be making milk, but a more aggressive sibling may be getting all or most of it. If the lamb sucks, it will probably be all right, and may have just become separated from its mother, but it will bear watching for the next couple of days. If the lamb is pretty weak, it is wise to give it a meal of two or three ounces of milk replacer to get it going again. If the lamb refuses to suck, check for sore mouth since it may not be sucking because of pain. If it has sore mouth that badly, you should treat the scabs topically with injectable vitamin B12, and should plan to stomach feed it daily or more often until the sore mouth subsides to the point where the lamb can suck again.

You may find that the ewe has rejected the lamb. It is usually impossible to get a ewe to reaccept a rejected lamb. If she pulls away and won't let the lamb nurse but accepts it otherwise, the problem may be sharp teeth that hurt her teats. Use an emery board to file off sharp edges and corners; that usually solves the problem. If she still won't let it suck, you should probably take the lamb to the bottle jug. If it is a single lamb, make sure the ewe doesn't get mastitis from not being milked out.

Starvation can be prevented by frequent use of your eyes, so be watchful. Keep the aspirin and the stomach feeder handy, and use both when called for. A lamb saved is just like having an extra one born.

Slow Growers

Be alert for slow-growing lambs. They may be almost starving but not quite. Perhaps the ewe has a poor milk supply, or the lamb can't compete with a healthier sibling. Maybe they are wormy. Watch those slow ones, because they may be stunted for life if they don't get going when they are young.

Broken Legs

Lambs may get their young legs broken, usually by an aggressive ewe or even by their own oafish mother sitting on them. Happily, lambs' bones heal miraculously quickly. The idea is to immobilize the leg. Simple splinting with wooden strips such as tongue depressors and some tape is useful for routine breaks. For more serious breaks, use some of the foam used for pipe insulation to hold the leg together with bone ends in position for rebuilding. Wrap that in tape, then enclose in some PVC pipe split lengthwise, applied and taped, to make the whole assembly stiff. Be sure to make the PVC shorter than the foam, so it doesn't cut into the leg. The leg and the splint should share the weight to make the healing work. The leg should knit together in three to five weeks.

If a break is up in the hip or shoulder, fold the leg carefully, strapping gently with tape to keep it from moving around, and suspend the folded member off the ground with tape over the back of the lamb. That way the leg will not be used and will heal itself. For these maybe six weeks is needed, but usually less.

I once splinted a lamb's right front leg, but it didn't stay in place the way I intended. The leg healed perfectly except that the hoof pointed ninety degrees to the right. The lamb cared not a whit, and also could sure turn a right corner quickly.

Stiff Legs

Lambs with stiff hind legs should be investigated to see what the cause is. It may be that the animal is constipated. Watch to see if it tries to defecate. It may strain a bit if constipation is the cause. Give it a couple of tablespoons of mineral oil. If it is eating dirt, the constipation may be mechanical in origin. We even had a lamb die from eating the leftover ground limestone in feed troughs. To stop dirt eating, give lambs an injection of 1 or 2 cc of an iron dextran solution.

Similarly, stiffness can be a symptom of enterotoxemia, especially if accompanied by hopping and convulsions. Give *Cl. perfringens* antitoxin, about 10 cc for a small lamb of less than twenty pounds or so and more proportionally for bigger ones, or as needed. Recovery will be dramatic if this is the cause and if the enterotoxemia was caught in time.

If the stiffness gives way to paralysis and the lamb drags its hindquarters along, the cause may be tetanus. Tetanus antitoxin will relieve the symptoms,

though not as dramatically as does the *Cl. perfringens* antitoxin. Also treat the lamb with penicillin and keep administering antitoxin until symptoms disappear. If an infected wound is evident, open it up and clean it out with hydrogen-peroxide solution.

Finally, stiffness in the legs can be caused by white-muscle disease and can be corrected by injectable supplements of selenium and vitamin E.

The symptoms of all these conditions are similar, so do a little armchair detective work to supplement your observations and you'll be a better shepherd. Tetanus is only likely if you docked or castrated with rubber bands or a crushing tool. White-muscle disease is improbable if you have never had it in your lambs previously, unless you have changed feed or breeds in some major way. If you haven't seen lambs eating dirt, then dirt blockage is not very likely, and so forth. Instead of watching TV tonight, get out your sheep disease book and do some reading. You might save a lamb or two. Less common causes of stiffness are polyarthritis, and polioencephalomalacia (PEM).

Infections

Check docks and castration wounds for infections. The usual culprit is *Corynebacterium*, which produces a lot of pale green pus. Clean the wound, paint it well with iodine, and give an injection of penicillin.

Some lambs and ewes may also have abscesses from the same organisms. The abscesses will appear as lumps on the chin or face or, less commonly, on other parts of the body. These will feel hard at first, but as they progress, they will soften. When soft, they should be cut open with a scalpel, drained, cleaned, and swabbed with iodine. Use a Q-tip to get the iodine all around the inside of the cavity. Dispose of the pus away from the flock so as to reduce spreading of infections.

Bottoms

At the bottom of the list is a check of the bottoms. A lamb with a wad of feces stuck between its dock and its anus has big problems. It only takes a minute to clean it up, but if left alone it can cause terminal constipation. If that doesn't get the lamb, the mold and fly maggots will. If the lamb is dirty from scours, take a pair of hand shears and trim away all the dirty wool. The lamb will look better and feel a lot better.

Maggots can also get into damp parts of the wool, in sheep of any age, and cause serious problems, eating away at the sheep itself. Under heavy wool they can be hard to spot until lots of damage has been done. If maggots are found,

clip off all the wool around the affected area, then clean the wounds with hydrogen peroxide solution, which will help sterilize the wound as well as float the maggots up and out. Be sure to check all over the affected sheep, as the maggots move around. Spray the sheep with an insect repellent to prevent reinfestation.

Check Your Bags

After a lambing time of lost sleep and frozen toes and fingers, followed by a lactation time of steady rain and knee-deep mud, you may be ready to check your bags at an airline or cruise boat ticket counter and forget it all for a while. But the bags I have in mind are the ones on your ewes. Detecting mastitis early is the only way to save a bag from loss, so do it.

The easiest way to check bags is to give your ewes their grain, then while they are absorbed in eating, move along behind them and check their bags with your hand. All but the jumpiest ones will tolerate the quick feel of a hand of a familiar shepherd. You'll soon learn what a healthy bag feels like. At the least sign of firmness or a lump, treat as described earlier. Unless that ewe is mighty valuable for her genes, she isn't worth a plug nickel if she can't nurse a lamb or two, so check those bags and save your ewes from a trip to market as culls.

EVALUATION

When you are watching the lambs, make mental notes or write them down if your memory is short. Lambs that are not doing well should be a hint that maybe a ewe is not doing her share. Inattentive mothers should be noted and possibly culled later. The lambs will be weighed late in lactation or at weaning, which will give you some hard facts to deal with, but don't discount the overall impression you get from simply watching. This is a good time to get some qualitative information to go with the quantitative data you'll gather later.