Routine and Emergency Medicine for the Sheep Flock

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Vaccines
Vaccination of sheep is an important procedure to assure health and prevent diseases that result in production losses and death. There are a number of useful products that are approved for use in sheep and their use should be part of a routine health program for all sheep producers. Programs outlining the exact times and ways in which the vaccines should be administered will be covered in other presentations within this conference. In this section the vaccines will be classified as to their expected usage in Virginia flocks. A list of rules and considerations for vaccine usage will also be put forth.

Vaccines used routinely in flock health programs:
- Clostridial Vaccines: Against Tetanus, Enterotoxemia (overeating disease) and other sudden-death diseases
  - Tetanus: Two major approaches to prevention
    - Antitoxins - Contain preformed antibodies against tetanus so protection is immediate but temporary. Frequently used at the time of docking and castration
    - Toxoids - Stimulate the protection of antibodies so there is a delay of weeks before full protection results.
  - Enterotoxemia vaccines: Both antitoxins and toxoids are available but the antitoxins are seldom used. Toxoids frequently contain Clostridium perfringens types C and D. Vaccination against these two is quite effective in preventing deaths due to enterotoxemia
  - Combination Clostridial vaccines. Common ones:
    - Tetanus and enterotoxemia combinations. These are very commonly used vaccines that also tend to be quite economical.
    - Multi-strain clostridial vaccines that contain the Clostridium perfringens types C and D as well as blackleg and other agents. Common ones are 7-way, 8-way and 4-way clostridials.
    - Eight strain clostridial vaccines with the common 7-way components and tetanus. These are the most complete vaccines but are also more expensive.

- Abortion prevention vaccines:
  - Campylobacter (Vibrio) vaccines are for prevention of abortion that may be catastrophic.
  - Chlamydia vaccines against a disease that causes abortion as well as weak lambs and a syndrome of problems at lambing time.
Vaccines used in situations where special disease conditions exist:

- Soremouth or contagious ecthyma vaccines. These vaccines are used by placing a drop of the vaccine on a scratched area inside the hind leg of sheep. Vaccines contain several but not all strains of the disease. May be useful for sheep before taking them to a show.
- Rabies vaccines. Effective but fairly expensive so generally reserved for situations where a high risk exists.
- Foot rot vaccine. Vaccine very useful as part of an eradication program as it increases cures and decreases new infections. Will not eradicate the disease without other management procedures. Generally too expensive for routine use in an infected footrot flock or as a preventive in a free flock.
- *E. coli* products. The most useful products are those designed to prevent losses from scouring in baby lambs. There are *E. coli* antibodies that must be given to lambs very soon after birth and vaccines that are given to the ewes before they lamb so that antibodies are passed to lambs in the colostrum.
- Caseous lymphadenitis vaccine. A vaccine against a disease that causes abscesses in sheep. The disease is rare in Virginia.

Vaccines available but not frequently used in Virginia:

- Serum products against Actinomyces, Pasteurella and Salmonella.
- Anthrax vaccines. This disease is fortunately too rare to justify routine protection in most areas.
- Bluetongue vaccine. This disease is, fortunately, not found in Virginia because the insect that carries it is not present.
- Epididymitis vaccine. Questions about the efficacy of this vaccine limit the use of this vaccine designed to prevent an infertility disease more common in the US west.
- Fusobacterium vaccine. This vaccine is primarily used to prevent foot rot in cattle, which has a different cause than sheep footrot. It is also quite expensive.

Rules for effective vaccination of sheep:

1. Be sure the vaccine you are using is against a disease that may be a problem in your flock.
2. Purchase a vaccine produced by a reputable company and marketed in such a way that it has likely been handled appropriately during distribution.
3. Handle the vaccine according to instruction. Generally this means refrigeration.
4. Follow the instructions carefully for such factors as:
   a. Route of injection (under the skin or in the muscle).
   b. Site of injection
   c. Use of boosters when recommended.
   d. Use at the appropriate stages of production.
5. Follow quality assurance techniques by avoiding injection into or over valuable cuts.

**Antibiotics**

Antibiotics are tremendously valuable aids in dealing with many diseases that attack sheep. They may, however, be abused if they are used for conditions that do not respond to antibiotics. There are also very few products approved for sheep. This is true because the approval process
for antibiotics in the US is very stringent. Because of the small potential for volume use of antibiotics in sheep the economics of the approval process have not encouraged companies to pursue approval for sheep. If antibiotics are used that are not approved the regulations for extra-label use must be followed.

The only antibiotics currently approved for use in sheep are:
1. Procaine penicillin G
2. Various oral neomycin products

Ten Lessons on Antibiotics
1) Consult with your veterinarian about diagnosis. As a producer, know what diseases are prevalent at particular production stages or seasons and remember that some bacteria are only sensitive to certain antibiotics.
2) Take the sheep’s temperature. Normal is 101°-103°F. If there is no temperature, there may be no infection, so use an antibiotic may not be advisable. Fever may precede other signs.
3) Treat early. Organisms become harder to successfully treat after they are well established. An antibiotic will not remove scar tissue from lungs nor treat abscesses once they form. Prevent theses by early and adequate treatment.
4) Maintain drug dosage for two-five days. Identify animals previously treated.
5) Prevent problems. Don’t rely on drugs to replace good management.
6) Check for management shortcomings as a cause of the problem before using drugs.
7) Vary antibiotics. Bacteria do develop resistance.
8) Take care of drugs. Refrigerate them, keep them out of the sun, and don’t freeze them.
READ DIRECTIONS!
9) Recognize the limitations of antibiotics. They won’t bring an abscess to a head and are ineffective in treating for diseases caused by a virus.
10) Administer antibiotics correctly. (a) Remember that sick animals usually don’t eat. Mixing an antibiotic in feed may prevent further attacks but won’t help those too sick to eat. (b) If sick animals will drink, you can administer sulfa treatment by adding sulfa to the water. (c) Use an effective injection method. Intravenous (IV) injections result in a high drug level in the blood rapidly, but antibiotics injected intravenously also are eliminated more rapidly. Intramuscular (IM) or subcutaneous (SQ) injections require the least skill and last longer. (d) Remember that drenching requires a high drug dosage. Not all drugs are readily absorbed.

Products for Parasites

Dewormers
Dewormers have become very widely used in sheep production in Virginia. The advent of effective dewormers has allowed production techniques, which are more convenient and have therefore been quite widely adopted. While these products are still quite effective in eliminating stomach worms there is increasing evidence that resistance to them has developed with very extensive usage.
As is the case with antibiotics, there are relatively few products approved for the treatment of intestinal tract worms and even fewer products that are now manufactured. The result is that extra-label use of dewormers is fairly common among sheep producers.

**Coccidiostats**

Coccidiosis is a disease of the digestive tract of sheep that results in diarrhea, unthriftiness and even death. It is a disease of confined sheep and results from manure contamination of feed, water and fleeces which sheep may then lick.

Products are approved for both the prevention and treatment of coccidiosis. These products area as follows:

- **Preventive:** Bovatec (lasolocid) - this product is available in several oral forms. It is most often given by mixing it into feed or a salt/mineral mixture. This product also alters digestion in the rumen so that sheep use feed more effectively. It is therefore frequently included in rations when lambs are being fed in confinement.
- **Treatment:** One sulfa drug is approved for the treatment of sheep that have developed coccidiosis.

**External Parasite Products**

A number of products are approved for the control of external parasites in sheep. The major external parasites that afflict sheep are lice, ticks and keds, nasal bots and fly larvae in fly-strike.

As noted above, Ivomec Sheep Drench® has label claims for lice, ticks and keds, nasal bots. The other products tend to be sprays, dips or pour-ons. A list of these products is contained in these proceedings in the skin disease section.

**Vitamin/ Mineral Preparations**

There are several vitamin/mineral preparations, which are approved for use in sheep. These are:

- **BoSe®** - This is a product that contains vitamin E and selenium. They are therefore valuable in the prevention and treatment of white muscle disease in lambs. Because Virginia soils are quite deficient in selenium this condition is quite common. In many areas newborn lambs are routinely injected with this product soon after birth. It should be noted that BoSe® is a prescription drug and must be purchased from a veterinarian and used according to his direction.

- Vitamin A, D and E preparations. These products may be used in certain conditions

**Extra-Label Use of Drugs**

The use of drugs in the United States is an activity that is regulated by law. The Food and Drug Administration is the government agency that deals with drug use matters and there is a Center for Veterinary Medicine that deals with all veterinary drug related matters. Regulations essentially dictate that use of drugs be according to label. Any use of a drug other than
Extra-label drug use guidelines may seem somewhat burdensome but do allow sheep producers to use the products that they need to effectively prevent and treat disease in their sheep in a legal manner.

**Diseases of Newborn Lambs**

**Lamb Starvation**
Lamb starvation, the number one killer of lambs, often is associated with lack of shepherding. Contributing causes are:
- The lamb doesn’t get started (gets no colostrum). Seventy-five percent of lambs that don’t get colostrum die for one reason or another.
- The ewe won’t claim the lamb.
- Mastitis.
- The teat is too big or is too near the ground and the lamb doesn’t find it.
- Sore mouth.
- The ewe can’t feed two or three lambs (mastitis, too little feed, etc.).
- Joint injury or illness.
- Pneumonia, which may be associated with lambs that received no colostrum and therefore lack antibodies.
- Difficult lambing.
- A “genetic will to die.” Actually, a number of lambs die for no apparent reason. A genetically related lack of vitality may well be the cause.

**Hypothermia (Chilling)/Hypoglycemia (Low Blood Sugar)**

**Clinical Signs and Causes.** Rectal temperature is the primary guide to identification and treatment of hypothermia in lambs. Mild to moderate hypothermia is characterized by a body temperature between 98° and 102°F; severe hypothermia occurs when the body temperature is below 98°F. Hypothermia is caused by excessive body heat loss coupled with reduced heat production. Newborn lambs are unable to regulate their body temperature for the first 36 hours after birth so environment and management practices greatly affect how much body heat newborn lambs may lose. Energy from body fat, colostrum, and milk is required by lambs to generate heat. Starvation depletes stored energy sources quickly and then limits the intake of adequate amounts of high-energy nutrients. Common, but not necessarily routine, findings on necropsy that suggest starvation include: the absence of milk in the stomach and intestine, a change in the color and consistency of fat around the kidneys from light tan and firm to purple and gelatinous, and a complete absence of fat in the abdomen.

**Prevention and Treatment of Hypothermia/Hypoglycemia.** Husbandry practices intended to prevent losses from hypothermia/hypoglycemia/starvation include: (1) providing shelter to ewes with newborn lambs to reduce body heat loss, especially during times of severe weather stress, (2) shearing or crutching ewes before lambing so lambs are not hindered from nursing, and ewes are less likely to lamb in exposed areas, (3) confining ewes and their newborns for one to two days to promote bonding and to check ewes for adequate milk production, (4) helping lambs with suckling during their first 24 hours to assure adequate intake of colostrum, (5) grafting extra lambs to ewes that lost their lambs, and (6) culling ewes with poor milk production.
according to label is classified as extra-label and was at one time considered illegal. Because of efforts by veterinarians and animal producers drugs may now be used in an extra-label fashion but only when certain requirements are met.

These requirements are meant to assure that drugs are used in such a way that they are safe for the animals, the people who use them and that the products that are produced by the animals in which the drugs are used are free of residues of the drugs.

Common ways in which drugs are used in an extra-label fashion:
- Use in a species other than indicated on the label. If a drug is approved only for use in cattle but is given to sheep that is an extra-label use.
- Use by any route other than according to the label. For example intravenous administration of a drug labeled for intramuscular use.
- Use at any dose other than according to the label. Penicillin dose is approved for 1 cc per 100 pounds body weight. Even though most experts agree that this dose is inadequate, giving a higher dosage is an extra-label use.
- Use for any condition other than listed on the label. If any antibiotic is used to treat listeriosis or a wound infection then that use is extra-label. The major condition for which antibiotics are approved is for the treatment of bacterial pneumonia.

Because of legislation recently passed and signed into law drugs may be used in animals even though the use is extra-label. However, such use must meet well-described guidelines or the use is considered unapproved or illegal. In general the rules for appropriate extra-label use are the following:

- Done under the direction of a veterinarian.
- Done only when there is no approved drug, which will be effective in treating the condition. This is frequently the case for sheep since there are a relative few approved products
- Done in the context of an appropriate "veterinary-client-patient relationship". This relationship is defined as:
  ✓ The veterinarian has taken responsibility for the animal's treatment
  ✓ There is enough evidence for at least a tentative diagnosis of the condition for which the treatment is prescribed
  ✓ The veterinarian is familiar with the care and keeping the animals that will be treated
  ✓ The veterinarian is available for follow-up or for dealing with any adverse reactions

Note that this definition stops short of requiring that a veterinarian examine every animal for which the drugs are dispensed.
- Exaggerated withdrawal times are observed so that any animals or products marketed following the use of these products do not contain drug residues.
- Drugs are appropriately labeled by the veterinarian so that instructions for use are clear and the veterinarian may be contacted for questions or if there is follow-up needed.
A common ratio of lambing pens (jugs) to ewes is 1:10. In areas where severe winter storms are common during lambing, a ratio of one jug for every eight ewes is probably a better and safer estimate of jug requirements.

Adequate nutrition of the late gestation and early lactation ewe is another critical factor in preventing hypothermia and starvation in lambs. Ewes with an energy deficiency are prone to low milk production and pregnancy toxemia. Both conditions contribute directly to starvation in lambs.

Hypothermic lambs do not get better on their own. For treatment of hypothermia, the following steps are recommended (Figure 10):
1. Move ewe and lambs to shelter or, if the hypothermia is severe, remove lambs from the ewe.
2. PRIOR TO WARMING, lambs more than five hours old with severe hypothermia (< 37°C, 98°F) should be given an intraperitoneal injection of a warm 20-25 percent dextrose (glucose) solution at a dose of four to five milliliters (CC’s) per pound of body weight. The injection can be given by the following procedure: (1) hold the lamb by the back legs in a hanging position, (2) disinfect the injection site that is located one inch either side and one inch behind the navel, (3) slowly insert a 20-gauge, one inch sterile needle, with the syringe containing the dextrose attached, into the abdomen, and (4) direct the injection toward the rump.
3. Towel-dry wet lambs. Supplement with heat or warm in a warming box using dry heat, e.g., a hand-held hair dryer or heat lamp. Temperature in the box should not exceed 103°F. Avoid overheating lambs by affixing a thermometer to the inside of the box and checking the lambs and the box thermometer regularly, at least every 30 minutes. Lambs should be warmed to 99°F.
4. Tube feed colostrum at the rate of 20 to 25 milliliters per pound of body weight per feeding after the lamb has been warmed (30 milliliters is approximately equal to one fluid ounce). Lambs unable to nurse on their own should receive this amount of colostrum by stomach tube three to four times during the first day of life.
5. Return the lambs to the ewe when rectal temperature is normal (usually one to three hours), and they can stand and nurse on their own. If lambs are still weak after treatment, they should be fed regularly by stomach tube until they are strong enough to join their mother.
6. If only one of a set of twin lambs is involved, remove both lambs from the ewe while warming is taking place and return both lambs simultaneously. Observe lambs frequently to check for relapses.

The procedures outlined are useful for lambs showing these signs no matter what the production system. However, these procedures are labor-intensive and can most easily be justified in intensive management systems in which large lamb drops are occurring. However, if the need to use these less natural procedures to assure lamb survival is not taken into account when selecting replacement animals, then it is likely that sheep will become even more dependent on man for survival.

**Pneumonia**
Pneumonia, the number one lamb disease, occurs because of a lack of colostrum, because of "mastitis milk," or because ewes are heavily infected with Pasteurella (One study showed a 99 percent infection rate, so the organism is frequently present). A lamb contracts pneumonia
because it can’t stand such stresses as too little milk, draft, dampness, and ammonia off a manure pack.

Early diagnosis of sick, unthrifty young lambs is crucial. Guessing the cause is relatively simple, because 90 percent of the time they are either starving or have pneumonia. Strive for early detection and start antibiotic treatment before the lungs have been permanently damaged. Treatment for pneumonia is to inject the lamb with antibiotics. Adequate selenium and vitamin E help the lamb withstand pneumonia. Keep the lamb strong!

**Baby Lamb Scours**

Scours are due to one of many bacteria. To minimize the problem, an adequate intake of colostrum (10-15% of body weight means 6 to 20 ounces of either ewe or cow colostrum depending on the size of the lamb. Must be given in the first 12 hours of life) is absolutely essential.

Scours may hit the lamb the first day of life. The lamb succumbs due to added stress (draft, ammonia, and poor ventilation). *Clostridium perfringens* type C may be the cause of baby lamb scours. Vaccinate the ewe four weeks prelambing to prevent it.

Treat scours with calf-scar electrolytes at the rate of 3% of body weight 2-6 times per day. Because these lambs often get pneumonia the injection of 1 cc penicillin or tetracycline (IM) or another antibiotic is often recommended. *E. coli* is often the cause. Preventive vaccines of the similar disease in cattle have been given to ewes before lambing. Sanitation is a more important preventive measure.

**White Muscle Disease**

The cause of white muscle disease (muscular dystrophy) is a lack of selenium or vitamin E or both. In Virginia, a lack of selenium in ewe diets is common. Signs are lambs born dead or weak or lambs that are unable to rise or walk or that do so stiffly. It may affect six- to eight-week-old lambs as well. Very often the fastest gaining lambs are affected.

To prevent white muscle disease, feed salt containing 90 ppm selenium, feed salt fortified with 100,000 I.U. vitamin E per 100 pounds salt, and injecting young lambs with selenium and vitamin E on day 1 of life.
The Influence of Vitamin E Supplementation During Late Pregnancy
On Lamb Mortality and Ewe Productivity
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ABSTRACT

Mature Rambouillet and Targhee ewes over a three year period (approximately 430 ewes per year) were randomly allocated within breed and age to either a vitamin E supplemented group or a control group receiving no supplemental vitamin E. Beginning approximately three weeks prior to the first expected lambing date all ewes were fed 2.3 kg/d of alfalfa-grass hay and .23 kg/d of a barley based supplemental pellet. The pellet with added vitamin E contained 1450 mg of d-l-alpha tocopherol acetate/kg and provided an additional 330 IU/hd/d of vitamin E. Selenium was incorporated into a trace mineral salt and fed free choice to all ewes throughout pregnancy. In ewes lambing in the early part of the lambing season, vitamin E supplementation reduced (P<.05) lamb mortality (17 vs. 12 percent lamb mortality for untreated vs. vitamin E supplemented ewes, respectively). Consequently, these ewes weaned 2.9 kg more lamb per ewe lambing (P<.05). No differences were observed (P>.05) in lamb mortality or kg of lamb weaned per ewe lambing among ewes lambing during the late lambing period.

Entropion
Entropion, or turned under eyelids, occurs most frequently in and is most damaging to lambs. It is an inherited condition and appears in most breeds. One treatment is to re-move a small section of the skin about 3/8 inches below the bottom eyelid, which will draw down the eyelid when the skin heals. The eyelid also can be clipped or drawn down with thread. Still another treatment is to inject ½ cc Penicillin into the lower lid in such a way as to fold the lid out. This treatment is less certain than the others described but can be done very quickly. Failure to correct the condition will lead to an unthrifty lamb that may remain blind.

Polyarthritis (Navel Ill)
Polyarthritis is arthritis involving one or more leg joints. It may or may not produce pus about the joint. Bacteria causing it include Corynebacterium pseudotuberculosis (the same bacteria that cause caseous lymphadenitis in ewes), Erysipelothrix insidiosa (swine erysipelas) as well as E coli and Staph organisms that are found in all environments. The organism enters the body through the umbilicus (navel) or through docking or castrating wounds. To prevent polyarthritis, disinfect the navel cord frequently and disinfect and do all possible to keep docking and castrating wounds clean. Keeping newborn lambs in as clean an environment as possible is crucial. Treatment with antibiotics is only moderately successful.

Tetanus: Tetanus is caused by Clostridium tetani, which persists in the soil of most farms. Next to horses, sheep are the most susceptible farm animal. The bacteria are anaerobic, so wounds in which air contact is limited are most susceptible to tetanus. Docking and castrating with rubber rings increase the incidence of infection. Disinfecting docking and castrating wounds will minimize it. Infected sheep become stiff, move with a straddled gait, and usually die. Vaccinating with tetanus toxoid and anti-toxin prior to docking is effective.
Infectious Causes of Stillborn, Weak, or Dead Lambs at Birth: A variety of bacterial, viral, and protozoal disease agents in sheep cause stillbirths and weak lambs. Bacterial causes include Brucella ovis, Chlamydia spp., Campylobacter spp. (Vibriosis), and Coxiella burnetti (Q fever). The two main viral causes are border disease virus (hairy shaker disease) and Cache Valley virus. The primary protozoal cause of stillbirths and weak lambs is toxoplasmosis. In each case, these agents also cause other disease signs such as abortion, pneumonia, and diarrhea. However, a higher than expected number of either stillborn or weak lambs may be the “red-flag” that prompts a flock owner to evaluate and investigate the disease status of the flock. Communication among the flock owner, attending flock veterinarian, and diagnostic laboratory personnel is critical for developing a systematic approach to identifying infectious causes of stillbirths and weak lambs. Except for border disease, the diagnosis, treatment, and control of these diseases are discussed in other sections of the handbook.

Border Disease (Hairy Shaker Disease)
Clinical Signs and Cause. Border disease (BD), which was first recognized in the border region between England and Wales, is now recognized as a disease of sheep worldwide. The hallmark signs of BD are newborn lambs with a hairy rather than wooly birth coat that exhibit muscle tremors (hence the alternate name of hairy shaker disease). Other characteristics of a BD lamb are small size, low birth weight, weakness, a dome-shaped skull, and a short, blocky appearance. BD lambs have a low chance for survival. If they do survive, the muscle tremors may disappear, but BD lambs will grow at a slow rate and are highly susceptible to other diseases.
A virus closely related to bovine viral diarrhea (BVD) virus causes BD. The effects of BD virus on a fetus depend upon the age of the animal at the time of infection. During the first 90 days of gestation, a fetus exposed to BD virus may suffer a variety of consequences. It may be resorbed, die and become mummified, aborted, or continue its development and be delivered full-term. After 90 days of gestation, a fetus exposed to BD virus can overcome the infection with no detectable signs of disease. Some lambs infected with BD virus in utero and born alive may not develop the hallmark signs of BD. Instead, they may appear normal, but are persistently infected with the virus. The virus lives in cells throughout these lambs. A lamb with a persistent infection is an important reservoir of infection within the flock, because it will shed high numbers of the virus throughout its life every time it sneezes, coughs, defecates, urinates, or bleeds.

Diagnosis. Border disease should be suspected in a flock if any of the previously mentioned clinical signs are observed. Testing serum samples from a group of animals for antibodies to BVD virus can detect if exposure to BD virus has occurred in the flock. A diagnosis of BD is confirmed by isolating the virus from tissue samples sent to a diagnostic laboratory. Most persistently infected animals do not develop antibodies to BD virus so a negative serological test on an individual animal would not rule out the possibility that it has BD. In a flock with a known high prevalence of exposure to BD virus, an animal without a BVD titer should be considered suspicious for persistent infection. Blood from a suspect BD virus shedder can be cultured for the presence of the virus.

Prevention. There is no specific treatment for BD, nor is there any USDA-approved vaccine for its prevention. BVD vaccines for cattle have been tried in sheep to control BD; results have been
mixed. The extra-label use of a BVD vaccine, or any other vaccine or drug, can only be prescribed by a licensed veterinarian in the context of a valid veterinarian-client-patient relationship. Efforts to control BD should focus on preventing or minimizing the exposure of susceptible pregnant ewes to the virus. Methods of control include maintaining a closed flock, testing flock additions for exposure to BVD virus before they are allowed to mix with the flock, and identifying and removing persistently infected animals.

Sudden Death: A young lamb that dies rapidly or is found dead with no apparent prior signs of illness is a major frustration to producers. Individual reactions to this event range from panic to unconditional acceptance. Instead of either extreme, a sound approach should be developed to determine the extent of the problem, its cause, and the source of exposure. Then, specific corrective measures can be formulated and implemented to prevent future problems. Like most disease signs, sudden death has a variety of possible causes. The most common causes include infectious diseases and trauma.

Infectious Disease Causes of Sudden Death
The most common infectious disease causes of sudden death in lambs less than three weeks of age are bacteria and the toxins they produce. The bacterial agents include Clostridium spp., Escherichia coli, Salmonella spp., and Pasteurella hemolytica. Since these agents are pervasive in the environment and are normal inhabitants of the respiratory or digestive tracts of animals, lambs will be exposed. But the chances for disease and death are reduced greatly if the lamb consumes adequate quantities of good quality colostrum during the first day of life. In addition, producers should pay close attention to the cleanliness of lambing sites, avoid permanent lambing sites, and disinfect the navel of newborn lambs with a strong iodine solution as soon after birth as possible to avoid problems associated with these agents. The role of colostrum in preventing disease as well as the disease agents C. perfringens type C, C. tetani, and E. coli are discussed in this section. Salmonellosis and pasteurellosis are discussed in the section on diseases of lambs — weaning to maturity.

Colostrum. Many infectious diseases occurring in the first few days of life result because the lamb did not get any or enough colostrum during the first 12 hours after birth. The newborn lamb, unlike the human baby, is born without protective proteins, called antibodies, in the blood. Antibodies are necessary to protect the lamb from bacteria and viruses that gain entrance into the body by various means. The first milk of the ewe, called colostrum, contains antibodies necessary for lamb survival. Vaccinating the ewe a month before lambing can increase colostrum antibodies against some diseases, such as the clostridial diseases. The antibodies consumed by the lamb pass from the intestines into the blood stream. However, a gradual closure of the intestine to the passage of antibodies occurs and is completed by approximately 12 hours after birth. Therefore, it is extremely important for the lamb to get colostrum as soon after birth as possible. Colostrum also contains concentrated levels of energy, protein, vitamins, and other nutrients needed by the lamb. To ensure survival, the lamb should consume an amount of colostrum equal to five percent of its body weight. For example, a 10-pound (160 oz.) lamb should receive eight ounces of colostrum within the first few hours after birth, four ounces immediately, and an additional four ounces within the next 12 hours. It is easier, quicker, and more effective to use a stomach tube rather than a bottle to feed colostrum to a weak lamb. A supply of colostrum should be kept on hand in case colostrum supplementation is necessary. Hypothermic lambs, orphaned lambs, and rejected lambs all may need colostrum.
supplementation. Fresh ewe colostrum is best, but stored colostrum can be used for up to two days if chilled properly. Alternatively, if frozen, colostrum can be good for a year or more. Frozen colostrum should be stored in small quantities (e.g., use Styrofoam or paper cups or ice cube trays) because thawing and refreezing will destroy antibodies. Colostrum can be thawed to room temperature with a water bath such as a double boiler. Microwave ovens can be used at low settings to thaw colostrum, but overheating colostrum increases the risk of destroying antibodies. If ewe colostrum is not available, cow and goat colostrum are good alternatives. There are also colostrum supplements available commercially. None of the alternatives is as good as ewe colostrum, but all are better than none. Cow colostrum is less concentrated than ewe colostrum so the lamb’s nutrient needs will require about 30 percent more cow colostrum. Also, bovine colostrum can transmit Johne’s disease from cattle to sheep as well as occasionally cause hemolytic anemia in lambs. Pooling colostrum from several cows will help minimize both of these risks. Goat colostrum can contain CAE virus or other disease agents that are infectious to sheep. Flock owners should ask about the disease status of the goat or cow herd before obtaining colostrum from that farm.

**Dystocia (Lambing Problems)**

Dystocia, or difficult birth, is common in sheep and causes the death of many lambs and ewes. Yearling ewes and ewe lambs are much more susceptible to lambing problems than mature ewes that have lambed previously. Obesity and lack of exercise during late pregnancy contribute to the incidence and severity of dystocia in sheep.

Ability to recognize lambing difficulty is as important as technique in relieving dystocia. A common error of the inexperienced shepherd is to intervene too early in the lambing process. A vaginal examination of lambing ewes should not be performed unless necessary because it increases the risk of infection of the female tract after lambing. A good general rule is to not intervene as long as a ewe is making progress. When a ewe has been in full labor for 30 to 40 minutes with no progress, examine it to determine if the lamb is positioned correctly. Never try to force the cervix open because it often leads to hemorrhage, shock, and infection.

There are few hard and fast rules about handling dystocia. Gradually developing expertise through experience is the best way to learn. Beyond simple assistance, the novice should call a veterinarian when in doubt about proper procedures. Many lambs and ewes die because of prolonged manipulation of lambs in the birth canal and use of excessive force when delivering lambs. Never try to forcibly extract a lamb that is in an abnormal position. The position of the lamb must be corrected before attempting delivery. Excessive force can result in shock, hemorrhage, post-lambing infection, fertility problems, and prolapse of the birth canal.

**Assisting Delivery**

It is usually best to position the ewe on one side on a clean piece of plastic or canvas to avoid contamination of the birth canal with bedding. Assisting the ewe in a standing position is also acceptable, but be ready for the ewe to lie down immediately when force is applied to the lamb.

If an examination is necessary, clip excess and dirty wool from the area adjacent to the birth canal and then scrub this area thoroughly with soap and water. Rescrub whenever the ewe contaminates the area with feces. Carefully scrub your hand and arm with soap and water and apply a mild antiseptic. Many veterinarians then use a plastic or rubber sleeve.
Next apply liberal amounts of lubricant jelly to the hand and arm. **This is critical.** It is almost impossible to use too much lubricant. Ewes that have been in labor for a long period often have a dry birth canal. Failure to properly lubricate the birth canal results in trauma to the tissues, a very difficult birth, and infection after delivery. It is often advisable to put mineral oil or lubricant jelly in the birth canal and even in the uterus before manipulating the lamb.

The normal birth position is head first with the head between the forelegs (figure 1). With multiple births, it is common to have the legs of one lamb and the head of another entering the opening of the birth canal at the same time. If forelegs and a head are present in the birth canal, gently pull on the legs to make sure that they are from the same lamb as the head. If the legs and head do not belong to the same lamb, take plenty of time to repel the head if necessary and follow the legs up to the body. If the problem is simultaneous delivery of twins, repel one back into the uterus while holding the other. This is accomplished by putting a lamb saver snare over the head of the lamb nearest the birth canal and holding it toward the rear of the ewe while repelling the other lamb. Do this carefully and gently, using lots of lubricant.

Anterior presentation (head first) with the lamb’s head turned backward (figure 2) is another common cause of dystocia. Repel the lamb, place a snare over the head, bring the forelegs into the birth canal, and begin steady traction on the lamb after thoroughly lubricating the birth canal. Use judgment and common sense on the amount of traction applied to the lamb. Once the head and forelegs are through the birth canal, apply traction as much in a downward as an outward direction because the birth canal is arc shaped. Pulling straight back forces the lamb into the top of the birth canal.

Lambs can be born quite easily in the posterior presentation where the rear of the lamb is presented toward the birth canal. Bring both rear legs into the birth canal, lubricate, and pull steadily. A breech presentation is the rear of the lamb presented to the birth canal with both rear legs forward (figure 3). Repel the lamb forward, grasp one rear leg, and bring it into the birth canal. Follow with the other leg. Use extreme care because the toes of the rear leg can easily penetrate the wall of the uterus during this procedure. When in doubt, call a veterinarian.

One of the most serious and, unfortunately, fairly common problems is a ewe that has been in labor a long time with a dead, swollen, retained lamb. The birth canal is dry, swollen, and the ewe may be quite sick. Seek professional attention because the life of the ewe is threatened. After delivery of the dead lamb, treat the ewe rigorously for infection and toxemia.

Occasionally, delivery through the birth canal is impossible, usually because of an excessively large lamb. A Caesarian section can be quickly and easily performed in such situations. A veterinarian should make this decision. The prognosis for both the ewe and lamb(s) is much better by avoiding prolonged attempts at delivery through the birth canal. When in doubt, get professional help.
Other Lambing Problems
Several other problems can occur at or near lambing time. Vaginal prolapse prior to lambing is common and may occur in large numbers in a flock. If this is a problem, a veterinarian should evaluate rations, housing, exercise, and general management.

Failure of the cervix to dilate, especially in ewe lambs, is a problem in some flocks. Its cause is not fully known. Selenium deficiency is known to be one contributing factor to this problem, but there are many others. Seek professional assistance.

Use drugs and hormones, such as oxytocin, only under the guidance of a veterinarian. Purchase of such prescription drugs without the order of a veterinarian is a violation of the Federal Food, Drug, and Cosmetic Act. Under a veterinarian-client-patient relationship, such drugs can be very valuable in the handling of obstetrical and lactation problems of ewes, but misuse is dangerous.