Many sheep and goat producers first contact a veterinarian for immediate treatment of common life-threatening emergencies such as neonatal challenges, enterotoxemia, mastitis, pneumonia, and tetanus. These problems often occur due to the producer’s lack of knowledge about biosecurity, livestock production, ruminant nutrition, parasite prevention, and specific disease prevention strategies. Veterinarians are uniquely qualified to diagnose and medically treat these common diseases as well as prevent recurrences through improving nutrition, management practices and biosecurity.

FAILURE TO THRIVE

There is nothing cuter than a newborn baby lamb or kid, and many small ruminant producers get their first sheep or goat as a neonate and have no idea how to care for it. The new owner may not ask the seller if the lamb or kid received colostrum, whether the dam was vaccinated for CDT or what and how often the neonate is eating. Instead, they bring the little soft and fluffy neonate home and are unprepared with either appropriate food or devices to feed it. Newborn lambs and kids are poikilotherms that quickly take on the temperature of their environment. Once they utilize their neonatal brown fat, they rapidly become hypothermic and hypoglycemic and will succumb quickly without prompt treatment.

While some veterinarians advise stomach tubing limp little babies with warm milk or colostrum, warming the neonate quickly in an incubator, clothes dryer full of hot towels or on a heating pad before feeding it will allow better digestion and absorption of nutrients. Once the neonate is warm, it will readily suckle colostrum or milk from the dam or a bottle equipped with a Pritchard Teat or flexible latex lamb nipple. Most lambs and kids will consume an ounce per pound body weight of very warm (102 degrees F) heat-treated colostrum or milk and thrive when fed three times daily from birth. While many sources advocate feeding neonates more frequently, it takes six hours to completely digest milk and newborns fed less frequently exhibit fewer cases of digestive upset or diarrhea. Heat-treating colostrum to 135 degrees F and maintaining it at that temperature with periodic agitation for one hour will prevent transmission of several infectious diseases that might be present in the adult herd such as caprine arthritis-encephalitis, ovine progressive pneumonia, caseous lymphadenitis, mycoplasma, Staphylococcal mastitis, or Johnes disease. Heat-treated colostrum can be frozen for future use in either ice cube trays or in packets sized for one feeding.
If the lamb or kid is to be hand-raised, feeding Pasteurized milk or milk replacer three times daily for eight weeks along with free-choice access to hay and grain allows the ruminant digestive tract to grow and develop. Commercial sheep and goat dairies often wean young stock as early as eight weeks of age. However, young stock transitioned more slowly by feeding milk or milk replacer twice daily from eight to twelve weeks of age, are larger as adults and more productive at one year of age.

**NEONATAL CONTRACTED TENDONS AND FRACTURES**

Contracted tendons and joints that bend the wrong direction are not uncommon in newborn lambs and kids and respond well to benign neglect. While it is tempting to apply splints to correct contracted tendons in neonates, most newborns self-correct quite rapidly if placed in an environment that allows them to push their feet against a rough surface so that they can stand and exercise their limbs. Putting the neonate in a cardboard box that is slightly wider than its body and the same length as its chest to tail allows the newborn to push against the corners of the box to stand. Most nursing dams tolerate having their offspring in a box where they can see them for a few hours each day, and most affected lambs and kids will self-correct by a few days of age.

The stifles and hocks on kids and lambs from large litters often bend the wrong direction at birth, and it is speculated that the lax tendons and ligaments in joints result from lack of movement in the over-crowded pregnant abdomen. When neonates are dam-raised, confinement of the dam and neonates to a small pen allows the neonates to exercise while remaining near the dam for nursing. Bottle-raised offspring can be housed in a small box as described above for a few days until the tendons and ligaments tighten and the animal walks normally.

Occasionally dams step on neonates and bad goat babies jump from ridiculous heights so long bone fractures are not uncommon in either species. Plastic mason metasplints or wooden paint stirrers padded with roll cotton and applied with roll stretch gauze and waterproof tape make excellent splints for neonates. A strip of Duct Tape at the top and bottom of the splint will help prevent premature removal of the splint, and the splint should be changed every two weeks as the young stock grows. PCV pipe cut in half longitudinally can be used for larger lambs and kids, and most simple fractures will heal within four weeks with one splint change. When allowing producers to change the splint, teach them how to apply gauze and tape correctly to avoid creating a tourniquet effect, and remind them that the cast or splint must be changed immediately if it gets wet.

**ENTEROTOXEMIA**

The most common cause of unnatural death in sheep and goats of all ages is probably enterotoxemia caused by toxin production from the bacteria *Clostridium*
perfringens types C & D, which are considered part of the normal intestinal flora. Experienced small ruminant producers vaccinate pregnant females thirty days prior to parturition to protect both the does and the neonates who consume high levels of protective antibodies present in colostrum. Breeding males should be vaccinated annually thirty days prior to introduction into the female population, and non-reproducing sheep and goats should be vaccinated at least annually. Many small ruminant veterinarians recommend vaccinating against enterotoxemia twice yearly due concern that antibodies against these bacteria may only last four to six months. Not all CDT vaccines are created equal, so choose a product licensed and labeled for use in sheep and goats, and follow manufacturer recommendations for dose, location for administration and frequency of use.

Clinical symptoms of enterotoxemia vary greatly but are often described as peracute, acute and chronic depending on how rapidly symptoms develop. Animals with the peracute form may be found dead or may exhibit sudden loss of appetite, severe depression, abdominal distension, vocalization, weakness, recumbency, coma and death. Neonates may demonstrate subnormal temperature, rapid pulse, injected sclera, a cold clammy mouth and lateral recumbency within a day or two of birth and die within a few hours. Older sheep and goats that become acutely ill develop symptoms more slowly, may exhibit diarrhea with associated dehydration and acidosis, and often have a history of feed changes or environmental stress. Occasionally, adult animals in herds that have a history of peracute or acute cases exhibit a more chronic form characterized by repeated bouts of inappetence, listlessness, and pasty feces with decreased milk production if lactating.

Diagnosis of enterotoxemia is based on history, recognition of classic clinical symptoms and response to treatment. Currently, no antemortem tests exist to confirm the diagnosis in live animals so most animals are treated based on clinical signs. Antibiotics such as intramuscular procaine penicillin G at 10,000-iu/lb body weight once daily kill the bacteria and stop production of gas and toxin. Commercially available Clostridium perfringens type C and D antitoxin may be administered intravenously in peracute cases or subcutaneously in acute or chronic cases with a loading dose of twenty ml that may be repeated every four to six hours until the animal stabilizes. Administration of non-steroidal anti-inflammatory drugs such as flunixin meglumine at 1cc/50lbs is recommended to counteract the toxins as well as relieve the intense pain associated with gaseous distension of the intestinal tract.

Animals that fail to respond to therapy should be necropsied to confirm the diagnosis and other animals housed in the same environment should be re-vaccinated when enterotoxemia occurs. Because enterotoxemia often follows over-nutrition errors such as sudden access to excessive milk, grain or fresh cut roughage, management practices should be corrected to prevent future losses.
MASTITIS

Whole sessions have been dedicated to the diagnosis, treatment, prevention and control of mastitis in sheep and goats but there are a few comments worth presenting here. The incidence of mastitis is higher in dams nursing offspring than in females whose offspring are separated from the adult population at birth and are fed mechanically. The mammary glands of females nursing their offspring should be examined shortly after birth to make sure that the offspring are nursing both udder halves and examination should be repeated any time that the dam or offspring exhibit abnormal behavior. Nursing offspring who are consuming adequate milk are quiet, calm and playful. Lambs and kids that are hungry due to inability of the dam to provide enough milk are agitated, vocal and unable to rest. Females consuming diets low in protein, energy and calcium and those that lack access to clean water will not produce adequate milk to feed their offspring. The mammary glands of females nursing their offspring should be checked for signs of mastitis at weaning so that they can be treated promptly prior to cessation of lactation.

Mastitis may present as acute, peracute, chronic or subclinical disease and the prognosis for recovery depends on early detection of disease, identification of causative agent, availability of efficacious therapy and good nursing care. Coagulase negative *Staphylococcus* species are a significant cause of subclinical mastitis in goats, and many laboratories do not report these bacteria as a cause of mastitis. Routine screening with the California Mastitis Test may lead to early detection of subclinical cases, and selection of appropriate antibiotics should be based on culture and sensitivity. Administration of appropriate pain relief, frequent milk removal and appropriate nutrition and nursing care lead to a very high success rate for treatment when mastitis is diagnosed early in the course of disease. Early treatment of mastitis decreases transmission between pen mates, prevents fibrosis of mammary tissue leading to lower milk production and improves milk quality.

Few pharmaceuticals are licensed or labeled for use in sheep or goats and current Food Animal Residue Avoidance Databank withdrawal interval recommendations for extra label use are often considerably longer than the label recommendations for cattle. Milk and urine from treated sheep and goats should be tested for antibiotic residue before milk, milk products or meat from treated animals is used for human consumption.

PERACUTE *MANNHEMIA* PNEUMONIA

Sudden, but subtle onset of anorexia, rapid respiration, and fever of 105-106 degrees F with high mortality rate is not uncommon in the transitional months of fall and spring when there is a wide swing in extremes of daily environmental temperature between day and night. Young stock and stressed males are particularly susceptible to peracute pneumonia due to *Mannheimia haemolytica*.
and the length of time between the observation of ill health and death may only be a matter of a few hours. There are no efficacious vaccines in this country to protect sheep and goats against any species of Mannheimia, and failure of protection through anecdotal use of available bovine vaccines by producers and veterinarians support this statement.

Clients should be encouraged to monitor feed intake, activity level and respiratory rates in breeding males and young stock, and they should seek veterinary assistance in affected animals as soon as the first symptoms appear. Aggressive therapy with ceftiofur administered once daily intramuscularly at the label dose of 1mg/lb for five to seven days combined with administration of flunixin meglumine at 1mg/lb has been successful in treating peracute pneumonia when recognized early in the course of the disease. Early recognition, stress reduction and good nursing care are necessary for successful treatment of pneumonia.

**TETANUS**

Tetanus is caused by introduction of the ubiquitous spore-forming gram-negative bacteria Clostridium tetani deep into soft tissue where anaerobic conditions allow proliferation of a potent neurotoxin. While the bacteria remain at the site of original introduction, the toxin moves up nerve trunks to the spinal cord where it blocks the inhibitory effects of the alpha motor neurons. Tetanic spasms result from sustained discharge of the motor neurons. Once in the spinal cord, toxin cannot be neutralized by anti-toxin and slowly degrades over time. Death results from respiratory failure due to tetanic spasms of the diaphragm.

*C. tetani* may be introduced through routine neonatal procedures such as dehorning, disbudding, tattooing, castration and tail docking as well as vaccination, hoof-trimming, dog bites, dystocia and shearing in adults. Sheep and goats sharing facilities with horses may be at higher risk for tetanus. The incubation period may be quite variable and range from a few days to several months.

While early symptoms include stiffness and altered gait, the disease is progressive and the affected animal may change from standing in a sawhorse stance to recumbency with erect ears, retracted lips and third eyelid prolapse. If muscles in the pharynx and larynx are affected, the animal may not be able to swallow and may salivate, regurgitate, bloat and aspirate fluids into the lungs causing pneumonia. Loud noises, bright lights or other stimuli may cause tetanic spasms. Death often results from respiratory failure.

Diagnosis of tetanus is based on classic clinical symptoms, and the prognosis for treatment depends on early intervention. Procaine penicillin G is administered twice daily at 10,000 iu/lb intramuscularly for the first two to three days and then once daily to kill the bacteria and prevent further toxin production. Intravenous
administration of 10,000 iu antitoxin every 12 hours for the first 24 hours may neutralize toxin not already in the spinal cord. Diazepam may be administered at 0.2 to 0.7 mg/lb intravenously or acepromazine at 0.1 mg/lb may be used as an anticonvulsant or tranquilizer.

Good nursing care includes keeping the animal in a quiet, warm, dark location away from stimuli. Intravenous fluids containing dextrose and electrolytes are indicated to combat dehydration due to inability to swallow. Ground feed and water may be administered by nasogastric tube, and the patient’s position should be rotated frequently to prevent ulcers.

All sheep and goats should receive an initial dose of combined *Clostridium perfringens* types C & D and *Clostridium tetani* vaccine as part of the routine disease control program. Pregnant females should be vaccinated 30 days prior to parturition, and breeding males should be vaccinated 30 days prior to the onset of breeding season. Young stock receiving colostrum from vaccinated dams should receive their first vaccination at one month of age followed by booster vaccinations at two and three months of age. Non-breeding animals should receive a minimum of one vaccination per year, and consideration of vaccination twice yearly may be indicated due to the short life span of these antibodies.

With their extensive background in nutrition, management, herd health and disease prevention, veterinarians are extremely well qualified to assist sheep and goat producers with sudden health emergencies as well as educating them about better livestock production practices, nutrition and disease control.