

Goat Vaccinations

By Laurie Getzendanner

Although there are many diseases that goats may be vaccinated against around the world, in the United States we are concerned with only a few. These include enterotoxemia and tetanus, and goats in confinement must be vaccinated against these diseases. You also may choose to vaccinate against rabies. These are the only vaccinations to be concerned with unless your herd has been infected with a specific disease requiring additional vaccinations. Selenium injections (BO-SE is used for goats) are not vaccinations but are often listed with vaccination schedules and will be discussed later. The enterotoxemia and tetanus vaccination (CD&T) can be purchased at some feed and seed stores (check the expiration date) and most goat and livestock catalogues. The rabies vaccination must be administered by your veterinarian. Likewise, BO-SE must be purchased from your veterinarian.

Vaccines work by stimulating the immune system to produce antibodies that protect against a specific disease. The vaccine itself does not protect against disease. No vaccine works 100% of the time. For a vaccine to work the animal must have an active and healthy immune system. After vaccination the immune system takes about 4 weeks to produce antibodies. These naturally produced antibodies give a fairly long term protection. Some vaccines require boosting to produce the maximum antibodies and give adequate protection. Kids are born with virtually no immune system. They get their first antibodies from colostrum (the first milk from the doe). At about 10 weeks those colostrum antibodies are wearing off and the kid is developing its own immune system. This is the time to start vaccinating kids. It has been shown in testing that vaccinating much before this age does not produce any measurable serum antibodies.

When giving CD&T we are vaccinating goats against two diseases. The C and D component vaccinates goats against a disease called enterotoxemia, caused by the bacteria *Clostridium perfringens* type C or D. Goats are very susceptible to this disease, whereas sheep, once vaccinated, are more resistant. The T is to vaccinate against tetanus, caused by the bacteria *Clostridium tetani*. You may give these vaccinations separately. However, it makes more sense to give them together by purchasing a CD&T vaccination preparation made for goats, sheep and cattle and thus giving just one injection. The injections are given sub-cutaneously, or under the skin. They are relatively easy to give and will save you money and time if you are able to learn to give your own injections.

Enterotoxemia

Goats are mainly affected by *Clostridium perfringens* type D although there have been reports of type C cited as the culprit. Goats may succumb to enterotoxemia even if vaccinated, but vaccination and management practices are our best defense. This disease does not respond well to treatment and is usually fatal.

Signs and symptoms of enterotoxemia include a loss of appetite, depression and weakness, abdominal pain which may be manifested by crying and kicking, and profuse diarrhea, possibly bloody. Coma occurs quickly followed by death.

Enterotoxemia is a disease caused by food ingestion and is often called the "over-eating disease". It may occur in nursing kids and affect the more aggressive eater. In weaned kids and adults it is most often caused by a sudden change in feedstuff. Conditions include things such as goats being turned out in the spring to lush pastures or having access to grass clippings, being fed bread or baked goods, introducing garden foods to goats that are not accustomed to them, and goats eating excessive grain products. Given the slightest opportunity goats will find their way to an unattended grain bag or storage bin. Enterotoxemia has even been reported to have been caused by a sudden change in weather in other species. It has also been documented to have occurred with no change in feeding habits, but rather in goats fed a bland diet of just grain and hay. Always introduce new food or a new type of grain slowly to your goats.

When the goat overeats or consumes newly introduced foods it may then develop indigestion which is accompanied by acid in the rumen (or the first stomach). If the *Clostridium perfringens* bacteria is present in the rumen it will proliferate in the acid environment and produce toxins. These toxins are what leads to the demise of the goat. Any goat that has developed enterotoxemia should be seen by a veterinarian immediately, but keep in mind that the disease is usually fatal. A necropsy should always be performed on a goat that has died of unknown causes. We can only learn from knowing the true cause of death. In this case, a diagnosis of enterotoxemia should cause the goat owner to change their vaccination schedule and eliminate the source of the feeding problem if one was identified.

It is generally recommended now that all goats be given the CD&T booster twice a year. Formerly the standard was once a year. If your herd has had an incidence of enterotoxemia then your herd should receive the CD&T booster 3 times a year. Pregnant does should be boosted 3 to 6 weeks before delivery. This provides for the transfer of antibodies in the colostrum to the kids. Kids from immunized does, who received a CD&T booster 3 to 6 weeks before kidding, should get their first CD&T vaccination at 10 to 12 weeks of age, with a booster 3-4 weeks later and a second booster 3-4 weeks after that. Kids from non-immunized does, those that did not get a CD&T booster a month before kidding can be given CD Antitoxin and Tetanus Antitoxin at birth and 4 weeks later to protect them until the vaccine and boosters can be given on the above schedule. Antitoxins give immediate but short-term protection, acting just like antibodies. Adult goats with unknown CD&T vaccination status can be given their initial vaccines and boosters just like kids. For maximum protection goats must receive both boosters after the first vaccination.

The dose is the same for all animals, adults and kids alike. Check the label for the dose or consult your veterinarian if uncertain of the dose. Apparently the dose can vary according to what brand of the CD&T vaccination you purchase. The type of CD&T that I purchase requires a 2 ml (2 cc) injection.

Again, all CD&T injections are to be given subcutaneously (“sub-Q or SQ”). CD&T is notorious for causing a local reaction which can be felt for a time as a lump under the skin. It may also develop into an abscess even if the injection was given correctly. If by chance the goat moves or kicks as the injection is given and the medication is actually injected into the skin layers as opposed to under the skin, the goat will most likely have a nasty reaction at the injection site. The injection is temporarily painful to the goats, especially young kids. I find that rubbing the site soothes the goat and helps to distribute the medication, thereby decreasing or eliminating the CD&T lump. I also like to give all of my CD&T shots in the same location so I am sure any lump is from the shot.

CD&T injections have been reported to cause anaphylactic shock. Anaphylactic reactions can range from itching to difficulty breathing caused by throat constriction to actual shock and total circulatory collapse. Should this occur give epinephrine as quickly as possible, 1/2 ml (cc) intramuscularly to an adult goat. Sublingual absorption may be quicker (squirt the epinephrine under the tongue). In true anaphylactic shock I would probably do both.

In summary, goats are highly sensitive to enterotoxemia. We can protect our herds by vaccinating against the disease, by introducing new food products slowly, and controlling access to stored grain and concentrates.

Tetanus

Most of us are familiar with the disease tetanus. It occurs in man as well as animals. The causative bacteria *Clostridium tetani* is commonly found in the intestinal tract of plant eating animals. Spores are passed to the soil via the feces and where they can remain for years. For practical purposes consider all soils infected with this bacteria. The bacteria can enter an animals body through any puncture wound and where anaerobic conditions are present tetanus will result. Once present the bacteria produces a powerful neurotoxin which ascends via the nerves to the spinal cord. This neurotoxin prevents the inhibition of muscular contraction and thus the affected animal suffers from continuous muscle contractions. This condition is known as tetany. Death usually results due to respiratory impairment. A goat with tetanus needs immediate veterinary care. Some goats may survive but the clinical signs will be present for several weeks.

Infected wounds of any type may allow *Clostridium tetani* to enter the goat’s body but it is most commonly found in deep wounds where anaerobic conditions (or the lack of oxygen) exist. These include but are not limited to: disbudding and dehorning, castration (particularly “banding” with elastrator bands), tattooing, dog or animal bites, fenceline wounds, chronic rubbing of a neck tether or an unchecked collar left on a growing animal, wounds from a horned goat, and oral mucosa wounds (inside the mouth) from eating briars and fibrous plants. Metritis after kidding can predispose to tetanus and even the umbilicus itself can allow the bacteria to enter the body. Deep wounds from hoof trimming are also particularly dangerous.

Tetanus vaccination or tetanus toxoid, can be given with enterotoxemia vaccination in the combination medication called CD&T. It can also be given separately. If using the separate tetanus toxoid, vaccinate all goats on the same schedule listed above.

If your goat sustains any of the above procedures or wounds be sure they have been recently vaccinated with tetanus toxoid. Otherwise, give tetanus antitoxin for *immediate* coverage. If giving tetanus toxoid to a goat for the first time keep in mind that it takes a period of time before that goat develops antibodies against *Clostridium tetani*. In this case, or if you have just purchased a goat and are unaware of its status, administer tetanus antitoxin. Tetanus antitoxin is also recommended in the case of young kids who have not yet received tetanus toxoid and are to undergo disbudding or castration. Tetanus antitoxin provides *immediate* passive immunity which lasts approximately 7-14 days. If a goat has a deep wound that is slow to heal you may repeat the tetanus antitoxin in 7 days. Tetanus toxoid should also be given at the same time as tetanus antitoxin for prolonged immunity if the goat has not received it recently or you are unaware of its status. Remember, tetanus toxoid is given for prolonged coverage and tetanus antitoxin for immediate coverage.

Vials of tetanus antitoxin come in 1,500 units and 15,000 units. You may choose to purchase a few of the 1,500 unit vials to keep on hand. They must be refrigerated. If ordering, have them sent in the cold packs. Otherwise, they will spoil. I have found it to be less expensive to order this versus purchasing individual vials from the vet. The dose listed in books for prevention of tetanus in young kids is 150-250 units and for adults 500-750 units. However, the package insert recommends 1500 units given subcutaneously or intramuscularly for prevention. I tend to give the larger dose. Again, anaphylactoid reactions may occur following the administration.

Rabies

The rabies virus belongs to the genus *Lyssavirus* and the family *Rhabdoviridae*. The virus enters the body through a bite from an infected animal. The rabies virus is endemic all over the continental United States and much of the world, although there are a few other countries that are rabies free. In the United States the incidence varies from state to state and even county to county. As goat owners we should be aware of how great is the risk our goats face from rabies.

Rabies in the United States is considered to be mostly sylvatic, or occurring in wildlife. Although rare, rabies does occur in goats. There is no vaccine approved specifically for goats. However, there are several approved sheep vaccines that appear to work in goats. Vaccination after exposure does not prevent the disease. Because of the rarity of this disease and the cost of the vaccination each goat owner must decide whether or not to vaccinate their herd. It is wise to discuss this with your veterinarian.

Selenium

Selenium/vitamin deficiency results when animals consume hay and/or forage over a period of time that have been grown in selenium deficient soils. This is a common problem in many parts of the country. You may consult your veterinarian as to the local selenium levels in soils in your area or have your hay tested through the local agricultural extension agency. There are also books and websites where this information can be found. I was told by one veterinarian that in our area one field may be fine and another nearby field may be selenium deficient.

Selenium and vitamin E (tocopherol) work together. Adequate levels of vitamin E are necessary for selenium to be absorbed from the small intestine. Vitamin E deficiency is frequent when goats are fed old hay. Selenium and vitamin E deficiency result in many of the same clinical signs. The complex is known as white muscle disease and particularly affects the skeletal and cardiac muscles. Signs are most obvious to the untrained eye in affected newborns. These kids will be weak, often too weak to suckle. The tongue will hang off to the side, evident when attempting to bottle feed. The pasterns may be bent and even if not, the kids will have difficulty standing or walking. They may have a cough or develop aspiration pneumonia from undeveloped muscles. They may even die a sudden death from dysfunction of the heart muscle and the diaphragm. They may sleep excessively.

Adult does also show signs of inadequate selenium which is manifested in their reproductive systems. These does may suffer from a decreased rate of conception, early abortions, retained placentas and poor uterine involution, metritis, mastitis, and deliver premature kids (also selenium deficient).

Selenium/ vitamin E deficiency can be treated by injection of a selenium/vitamin E compound (BO-SE is used in goats) under the guidance of your veterinarian. Selenium toxicity will occur if you administer too much or administer it too often. Blood levels can be measured although the result will be reflective of the recent selenium consumption as opposed to the last three months. Any necropsy of a goat is a good time to request liver selenium levels which are more accurate.

BO-SE is a selenium and vitamin E supplement, not a vaccination. It is often grouped with vaccinations as it is an injection administered as needed, most often to newborns, young kids, and does ready to kid. Some recommend it to does and bucks prior to breeding. BO-SE can sometimes be purchased from your veterinarian; other veterinarians prefer to dose the goats themselves. BO-SE is given by weight (1 cc per 40 pounds given subcutaneously). Most newborn kids requiring a selenium injection are given 1/4 cc. Does ready to kid requiring additional selenium should be given BO-SE one month prior to kidding.

Pay particular attention when attempting to bottle feed selenium/vitamin E deficient kids. Again, the muscles are not developed and aspiration pneumonia is common. Feeding can be accomplished with the use of a stomach tube but be careful when removing not to let milk enter the lungs. I have had experience with kids afflicted by selenium/vitamin E deficiency (necropsy proven in our first two cases) and have found in most cases they respond to an injection of BO-SE in two days if given within the first day or two of birth. Depending on the progress of the kid I may repeat the injection. Properly treated, these animals will go on to develop and reproduce normally if the selenium/vitamin levels are maintained, preferably through dietary means.

If you experience a selenium deficient kid, do take a closer look at your herd. More than likely if one animal is deficient then all are at risk provided they are all fed the same. Selenium is present in nearly all grain mixtures and mineral preparations, but the amount present is restricted by government regulations. Also keep in mind that salt blocks simply will not meet the mineral needs of your goats. Purchase loose minerals containing selenium (and copper) and aim for each pygmy goat to consume an ounce of loose minerals per day. In my herd I add some grain to the minerals and the goats fight over them.

Selenium/vitamin E deficiency is treatable if you recognize the signs and develop a treatment program with your veterinarian.