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The Use of Vaccines in Sheep

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1. What is a vaccine?

A vaccine is a manufactured compound that is designed to help animals fight against particular diseases caused by specific bacteria and viruses. It contains materials called antigens that stimulate the body's defenses to produce either antibodies or activated cells that in turn modify or inactivate the agents of disease.

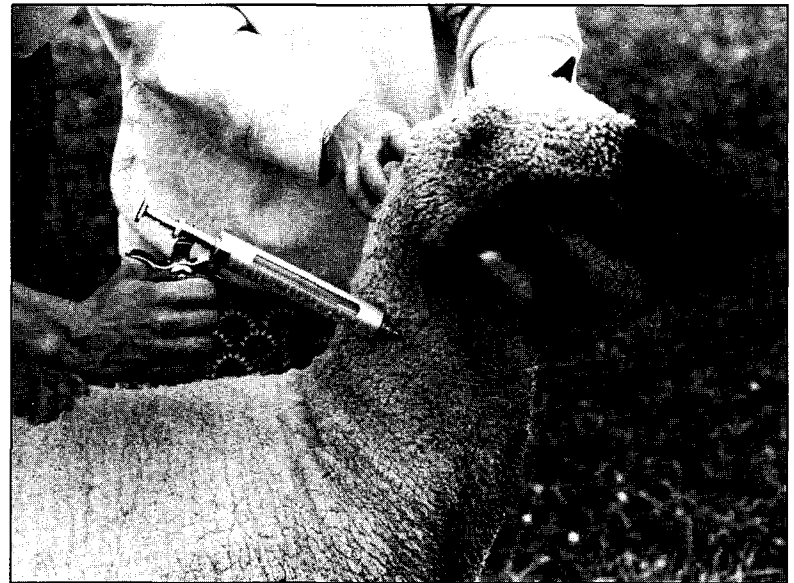
Each vaccine also contains a component called an adjuvant that stimulates the animal's immune system. It is this component that causes a lump to form where the vaccination was given; this property contributes to the adjuvant's ability to stimulate the animal's immunity over a sustained period of time.

Vaccines may contain live viruses (though these are modified to reduce their potential harmful effects), killed viruses, or inactivated bacterial cultures or toxoids.

Through regular usage, vaccines are designed to reduce the incidence and/or severity of a specific disease. Few vaccines can completely prevent disease occurrence. However, when used properly, their beneficial effects far outweigh their drawbacks.

2. How do you know which vaccines to use, and which not to use, in your sheep?

Ask for veterinary advice on prevalent diseases that are preventable by vaccines. Different farms in different areas have different needs. Your veterinarian can help you design a farm-specific vaccination program for your ewes, young lambs, market lambs, replacement ewe lambs, and rams. It is much cheaper in the long run to have an accurate diagnosis made by your veterinarian using a diagnostic laboratory than to use vaccines in a shotgun approach.



Subcutaneous vaccination

3. How do you know which vaccine products to purchase?

Buy products from reputable sources. You need to be satisfied that the vaccines have been properly stored, are active, and are not damaged by being outdated or exposed to temperature extremes. Purchasing these products from a veterinarian or a reputable biological source will ensure that you are buying a safe, effective product and are also getting some low-cost, valuable advice. As of January 1, 1991, all vaccines are required to be produced by a manufacturer licensed by the U.S. Department of Agriculture.

4. How should you store your vaccine?

Always follow the label instructions. The label on the vaccine bottle is your best guide for proper storage. Most vaccines are to be kept in the refrigerator. Their activity may be destroyed by excessive

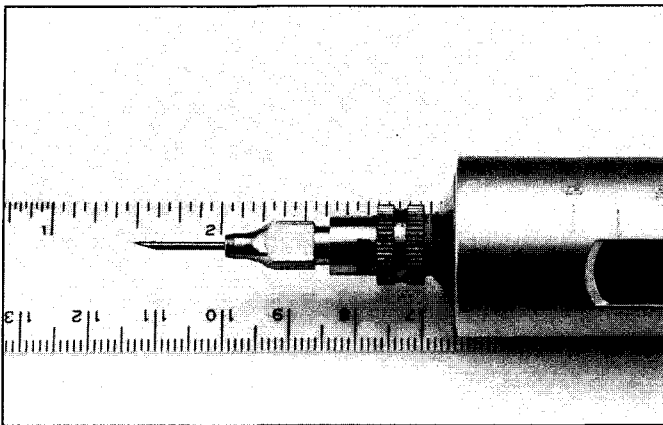
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hot or cold temperatures or ultraviolet light. In general, additives such as penicillin or selenium should not be added to vaccines unless recommended by the manufacturer.

5. When and how should you give vaccines?

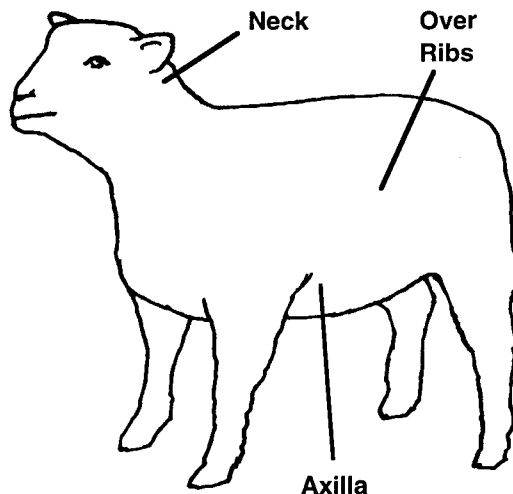
Use the vaccine's label as a guide regarding how and when to give that particular product. Vaccines should be given at strategic times of the year or season. These times vary depending on the vaccine and particularly on the disease which you are trying to control. Always record the vaccine's lot number, which is printed on the side of the bottle(s), just in case the sheep have an adverse reaction. The site and route of administration may vary depending on the vaccine. Most vaccines are administered by under-the-skin (subcutaneous) injections. A few are administered intramuscularly, and occasionally some are given topically (e.g., soremouth vaccine) or intranasally.



A 1/2-inch needle for subcutaneous injections

For subcutaneous injections, use a sharp 1/2- to 3/4-inch length and 16- or 18-gauge diameter needle. One good site for subcutaneous vaccinations is over the ribs. Another is the axilla, behind the armpit. A third is high up on the neck, a site that is easy to reach and is unlikely to result in lameness and muscle (carcass) damage.

Needles should be switched after every 20-30 sheep to minimize infection and the risk of disease transfer. Needles should be changed immediately if dropped or contaminated. Always, always use one freshly opened, sterile, disposable needle to withdraw vaccine from the bottle. Only use this needle to withdraw vaccine. Don't use this needle on sheep and then refill your syringe with this needle, as you will be introducing skin and fleece bacteria into your bottle of vaccine. If the contents of that



Sites for subcutaneous vaccination

bottle are not completely used and the bottle is stored for later use, then bacteria may grow from this contamination and may kill the next sheep that receive this stored vaccine.

The type of syringe that is used is the individual operator's preference. Always check the syringe before and while in use to be sure it is consistently delivering the correct amount. Be absolutely certain that both syringes and needles are sterile prior to vaccination. If the syringe has been washed with disinfectant, be sure that this solution has been thoroughly rinsed out, as disinfectants will inactivate live vaccines.

6. When should you use vaccines?

The response to this question depends on the individual farm, age of sheep, previous disease problems, whether the flock is open or closed, geographic region of the country, soil type, diet, and the flock economics.

The recommended use of vaccines includes:

(1) Those products effective against *Clostridium perfringens* types C and D, commonly called "overeating" or "C & D." Protection against Type C is needed by the milk-dependent lamb regardless of the farm and management. Vaccinating the pregnant ewe 2 to 4 weeks before lambing will result in protection/immunity to these clostridial diseases in the form of antibodies being passed on to the lamb via the ewe's colostrum, her first milk. This passively acquired immunity lasts for the lamb's first 50-60 days of life. Ewes lambing for the first time should be vaccinated twice in late pregnancy, about four weeks apart.

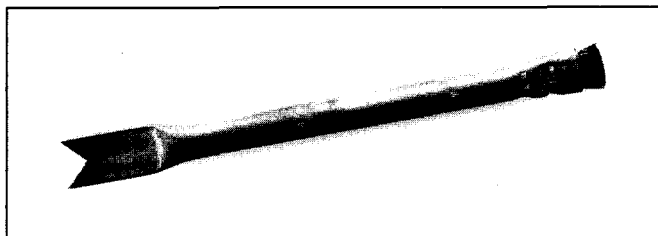
Protection against Type D is needed by the grain-fed or lush forage-fed lamb. High-carbohydrate diets encourage the proliferation of *Clostridium perfringens* type D, which produces the deadly toxin that can produce sudden death in fast-growing lambs. Lambs need to receive additional vaccinations against Type D at weaning and again 2-4 weeks post-weaning.

If the ewes were not vaccinated in late pregnancy, then the newborn lamb should be vaccinated within the first few days of life and again 2 to 3 weeks later. The lambs should also be revaccinated (boostered) at weaning. Purchased feeder lambs ought to be vaccinated against Type D at the time of purchase and 2-4 weeks later.

(2) If tetanus has been a problem on the farm or you use elastrator bands for docking or castrating, then tetanus toxoid should be included in the pregnant ewes' pre-lambing vaccination, i.e., at the same time as the "C & D." There are products available that contain all three components in one bottle. Otherwise, the lambs should receive tetanus antitoxin and long-acting penicillin when the bands are put on. The long-acting penicillin should be repeated in a week.

(3) If soremouth (contagious ecthyma) has occurred on the farm or you have bought sheep from a farm that has had soremouth, then your ewes should be vaccinated well in advance of lambing, i.e., at least two months before lambing is due to start. Then the ewes will be immune when they are suckling lambs. Otherwise, ewes may develop soremouth on their udders and teats and seriously risk permanent damage due to secondary bacterial mastitis. Sheep should be vaccinated in an area of the body free of wool. Ewes should be vaccinated inside the ear or under the tail, so you don't have to tip them up. Immunity to this disease is not transferred to lambs via colostrum no matter when the vaccine is given. Young lambs should be vaccinated inside the thigh.

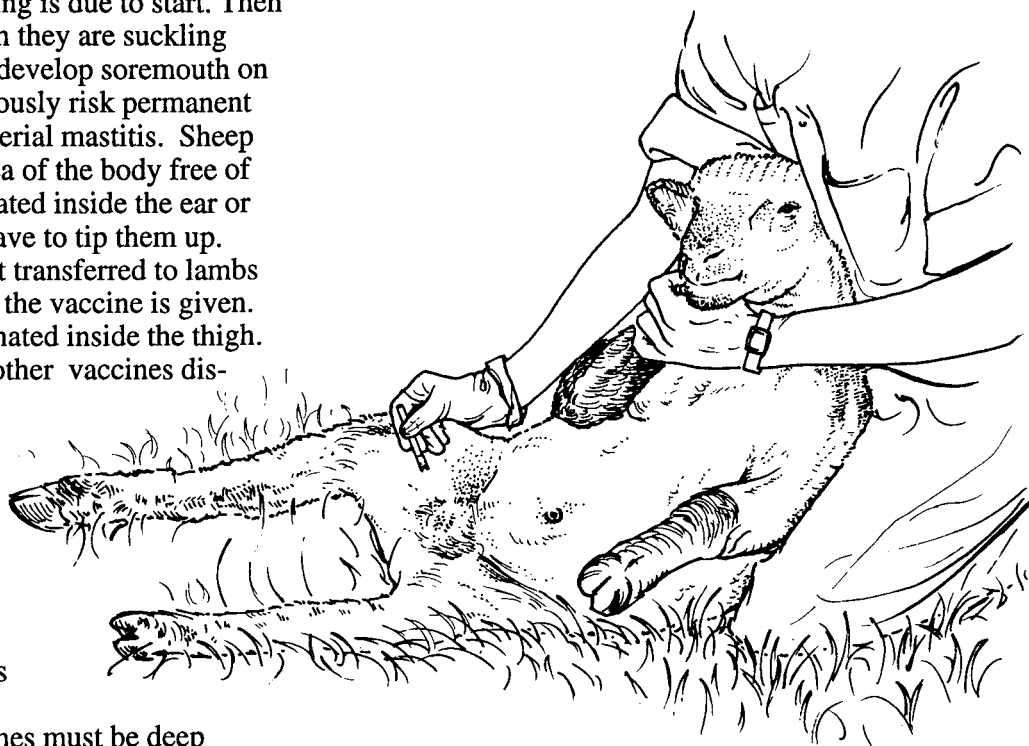
Unlike the applications of other vaccines discussed here that are normally given under-the-skin, the soremouth vaccine is given percutaneously by scratching the skin in a wool-less area (inside the thigh or ear, under the tail) and brushing on the vaccine. Using the vaccine's applicator, make two scratches in the form of an X. Then apply the vaccine. The scratches must be deep enough to allow the vaccine virus to enter the skin,



Soremouth vaccine applicator

but not so deep as to cause enough bleeding to wash the vaccine off. In a week, check some of the vaccinated lambs to be sure that the vaccine has satisfactorily taken. A good vaccine take should be raised and white in color surrounded by a red zone. An insufficient take will look like the thick brown line of a healing scratch. A visual check of the vaccine take will provide feedback of your vaccination technique.

The virus within the scabs from the vaccine take is alive; therefore, the scabs are infective even after they have fallen off the sheep. It is advisable to have the ewes go through this scab formation and fall-off stage prior to being moved to their lambing area so that the young lambs are not surrounded by large doses of virus prior to developing their own immunity. This virus is contagious to humans through contact with scabs that develop as a result of either the natural disease or vaccine. As this vaccine contains live soremouth virus, it is important to wear disposable plastic gloves when administering it. Don't allow children to play with sheep that have



Soremouth vaccination of a lamb

soremouth. Always wash your hands well with soap and water after handling sheep.

The protection provided by soremouth vaccines is not 100 percent when vaccinated sheep are strongly challenged. If a well-vaccinated flock is mixed with either heavily infected sheep or exposed to a heavily contaminated environment, then some vaccinated animals can be expected to develop soremouth lesions. But these sores will be less severe and resolve more quickly than if they had developed in non-vaccinated sheep.

Use of this vaccine on soremouth-free farms will result in its introduction; therefore, soremouth vaccine should not be used on farms that do not already have this disease or are not at a high risk of contracting it.

(4) If you have had a problem with scours in one- to two-day-old baby lambs, then the most likely cause is a bacteria named *E. coli*. You now have a couple of options to help reduce the problem. You can vaccinate against *E. coli* at the same time as you are giving "C & D" vaccine to the pregnant ewe 2 to 4 weeks pre-lambing. Then the *E. coli* antibodies will be contained in the vaccinated ewe's colostrum. An alternative is to give each lamb oral *E. coli* antibody at birth. Either of these approaches should help prevent lamb deaths. If the lambs do develop diarrhea, they are much more likely to survive with some additional attention to fluid and electrolyte losses and nutritional needs.

(5) Use anti-abortion vaccines if the flock is at risk of abortions due to two specific infectious causes of abortions. Risk factors would include an open flock (introduction of new sheep), feeding on the ground, and a history of abortions in the flock.

How do you know if you should be using anti-abortion vaccines? Vaccines are commercially available for only two causes of abortion, specifically *Campylobacter fetus* subspecies *intestinalis* and *jejuni* (which is commonly referred to as vibrio) and enzootic abortion caused by *Chlamydia psittaci* (also called EAE). One can purchase a combined vaccine or vaccines against either EAE or *Campylobacter spp.* alone. These vaccines are useful in flocks that have previously had abortion problems due to either of these two bacteria. In flocks that are vaccinated annually, the ewes should be vaccinated subcutaneously (under the skin) two weeks prior to breeding. Ewes being vaccinated for the first time should receive a second vaccination (booster) in mid-pregnancy. Producers with problem flocks may consider giving a booster as well.

When buying new sheep, it is best to find out if there have ever been any previous abortion problems and the associated causes in that flock. Whenever new sheep are brought in, they may present a risk of silently introducing new diseases to the resident flock. Use of these anti-abortion vaccines is advisable in flocks in which pur-

chased ewes are periodically added.

Don't be unduly alarmed if some abortions occur in vaccinated flocks. This can happen for a couple of reasons. First, the cause of the abortion may be something other than that for which the sheep are vaccinated. No vaccines exist in the U.S. for *Toxoplasma gondii* and *Salmonella spp.*, both of which can be common causes of sheep abortions. Second, no vaccine is 100% effective at preventing abortions and when they occur, certain precautions must always be undertaken. Sheep should always be fed out of feeders rather than on the ground, because cat and sheep manure deposited onto feed can serve as a source of infection. Aborted fetuses and placentas should be submitted to a diagnostic laboratory for veterinary examination and diagnosis. The aborted fetus, placenta and fluids that are discharged from the ewe are all potential sources of infection. Therefore, the aborted fetuses and placenta should be burned or buried (if not submitted to the lab), a disinfectant applied to the contaminated area, and the affected ewe should be isolated from other sheep for a minimum of two weeks.

Add leptospirosis bacterin only if leptospirosis is a very likely problem. This bacteria is not thought to be a common cause of abortion or other problems in sheep in Minnesota.

(6) Footrot infected flocks will benefit from the strategic use of Footvax® vaccinations in conjunction with additional management procedures aimed at eventual disease eradication. Some of these procedures are regular foot trimming, zinc sulfate footbathing, isolation of affected animals, strategic use of antibiotics, provision of dry footing, and culling of non-responsive carrier sheep. This vaccine should be given under the skin high up on the neck and just behind the ear. Repeated vaccination for several years may be necessary before significant effects are visible.

(7) Some producers use a vaccine called Nasalgen® in newborn lambs. It is effective against a respiratory virus called parainfluenza-3 (PI-3), which may play a role in lamb pneumonia. This vaccine is freshly mixed up for each lamb and given at birth or at processing. The vaccine is given in the form of a nasal spray into each of the lamb's nostrils. Nasalgen, administered in this manner, has sometimes been helpful in lowering the incidence of pneumonia in young lambs and may be useful to try on your own farm to see if it helps your sheep.

(8) A killed vaccine against the rabies virus is available. However, for economic reasons and the low risk of sheep contracting rabies, using the vaccine is recommended only in very valuable sheep.



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