



## **BASIC IMMUNOLOGY**

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**International SheepLetter**

**Vol. 20, No. 4, June/July 2000**

We often are faced with many options to help control disease. Adequate nutrition, sanitation, isolation and treatment of sick animals are often means that help control or minimize disease. Furthermore, some diseases lend themselves to control by vaccination. In the next few paragraphs we will take a look at the components in the little plastic bottle and how they work to prevent disease.

**Antigens and Adjuvants:** First of all let us review the components a vaccine. A vaccine is made up of two basic components: one or more antigens and an adjuvant. Antigens are proteins that white blood cells recognize and make antibodies against. This helps the immune system recognize these as foreign and thus allows the immune system to eliminate them from the body. All cells, bacteria and virus contain these antigen proteins on the surface of the cell, bacteria or virus. To make a vaccine the manufacturer purifies these proteins and combines them with an adjuvant. The adjuvant stimulates the immune system to develop antibodies to the antigens. The characteristics of these antigens are stored in memory cells which rapidly produce antibodies if that type of antigen is recognized. There are many types of different adjuvants. Some work better than others. Many vaccine manufacturer's have patented adjuvants and label them with catchy names. For example in the vaccine Vision CD/T with Spur, Vision is the label name of the vaccine, CD/T are the antigens and Spur is the manufacturer's special adjuvant that is claimed to make the Vision vaccine superior to other CD/T vaccines.

**How vaccines work:** When the vaccine is injected into a sheep the chemicals in the vaccine cause tissue irritation. This results in blood flow to the injection site and with the blood comes white blood cells. The white blood cells become exposed to the antigen and begin a series of processes that cause antibodies to be produced to the antigen. The period of time from when the vaccine is injected until production of antibodies takes 2-3 weeks. At three weeks the level of antibodies is at the peak and begins to decrease. At this time most vaccines require a booster vaccination. If the booster vaccination is given the immune system is again stimulated and because of immune system memory the result is an antibody level 2-5 times higher than after the first of primary vaccinations. If the booster vaccination is not given the antibody level declines rapidly. In the world of fighting infection the more antibodies the more effective the immune system will be at eliminating infection and the more protection the animal has.

The annual booster: Many vaccines require an annual booster. This is to increase the antibody level in the body. Each subsequent vaccination serves as a booster in that it boosts the amount of antibodies present. In the case of Clostridia CD/T it works well to booster the ewe 3-4 weeks before lambing. This will boost the antibody level in the blood and thus in the colostrum. In this case the lamb will benefit by absorbing high levels of antibodies from the colostrum. Of course this is only effective if the lamb suckles colostrum, thus the importance of adequate colostrum intake in the first 24 hours of life.

Vaccinating Young Lambs: Vaccinating young lambs is a bit of a guessing game. Lamb under 4 weeks of age have a poorly developed immune system and generally don't respond well to vaccines. There are times when we have no other option but to vaccinate young lambs, such as in the case of a tetanus or Clostridia enterotoxemia (overeating) problem. Often we will receive some protection but not as much protection as a lamb that is vaccinated when it is over four weeks of age. Therefore, if the initial Clostridia Type C & D vaccination is given to lambs under four weeks of age, two boosters of the vaccine are necessary.

Side Effects: The most severe side effect that we see with sheep vaccines is swelling at the injection site and lethargy for a day or two following vaccination. The swelling is variable between different types of vaccines and is dependent on the adjuvant in the vaccine. The worst examples of this are footvax and casebac. Because of this common side effect we encourage producers to give all injections subcutaneously. Often sheep may be off feed, slow, depressed and lethargy for a day or two following vaccination. Sheep are generally back to normal in 48 hours. As with any animal health product be sure to follow label directions.