

# Dairy Herd

## Vaccination Programs

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### **We expect a lot from vaccines.**

In many cases we expect too much. In human health we have benefited from a number of vaccines which give almost absolute protection against infection. If correctly vaccinated against smallpox, poliomyelitis or tetanus, we are confident that we will never get these diseases. Some veterinary vaccines give this level of immunity. Examples are the vaccine against Cattle Plague (Rinderpest), which was a scourge of livestock production in the nineteenth century and remains so in less developed parts of the world. Some of the veterinary clostridial vaccines, such as blackleg vaccine, or viral vaccines, such as modified live Bovine Virus Diarrhea vaccine can provide absolute immunity. But many vaccines are not capable of giving this level of protection and the immunity they confer can be overwhelmed by a heavy challenge or by strain differences in disease-causing pathogens. In the case of cattle respiratory diseases, the causes may be so complex that no single vaccine can provide protection. Some vaccines such as the bacterins against *Pasteurella pneumonia*, pinkeye and staphylococcal mastitis, give relatively weak immunity, as do many of the killed viral vaccines. Some modified live virus vaccines give excellent, long-lasting protection but have restrictions on their use because they may cause abortions or interfere with immunity to other vaccines. On the other hand, we do have a very large range of veterinary vaccines to choose from. The challenge is how to use them effectively in the complex management system of the modern dairy.

With few exceptions, vaccines are not a panacea for the infectious ills of a dairy farm. However, if used correctly in a management system which minimizes the challenge from infectious agents, and boosts the capacity of animals to respond to vaccines, they can substantially alleviate the infectious disease pressure on the herd. These management devices include general health management, control of the environment, proper nutrition and the minimization of stress.

### **Brucella (Bang's) Vaccine**

A new calf-hood Brucella vaccine, called RB-51, was approved for use in Indiana beginning July 1, 1996. Use of the Strain 19 vaccine is no longer permitted in Indiana. The RB-51 vaccine is a live vaccine like Strain 19, but unlike Strain 19, causes no antibody response at all, although it gives the same level of protection. It therefore does not cause "false positive" reactions in Brucella blood tests in the way that Strain 19 sometimes did. Identification of dairy heifers vaccinated with RB-51 requires a USDA ear-tag and an ear tattoo with "R", the "V" shield, and a number representing the year. Age limits for vaccination are the same as Strain 19, i.e., legally 4-10 months but preferably 4-7 month's of age. Calf-hood vaccination against brucellosis is voluntary in Indiana.

### **Protecting the Newborn Calf**

Vaccines are available to protect newborn calves against some of the causes of diarrhea. The most effective use of these vaccines is to immunize the dam in order to boost antibody levels in colostrum, and then make sure that the calf is fed an adequate amount of colostrum within two hours of birth. A rule of thumb is to feed two quarts of colostrum at birth and two quarts again within the first twelve hours of life. Vaccines against *E. coli*, rotavirus and coronavirus, when given to the dam in late pregnancy will help to control diarrhea caused by these agents, as long as colostrum feeding and management of the calving environment are excellent. Salmonella bacterins are of limited value. There is no vaccine against *Cryptosporidium*. Oral vaccination of the calf after birth is much less effective, and depends on getting vaccine strains into the calf before it ingests the disease causing organisms from the environment. Oral vaccination, administration of specific *E. coli* antibody and colostrum preparations, may help in the face of a diarrhea outbreak but are certainly not the preventive method of choice.

## Respiratory Disease Vaccines

A wide range of vaccines are available against viruses and bacteria which are associated with respiratory disease in cattle. The commonly used respiratory disease complex vaccines contain components against a number of viruses, usually BVD (Bovine Virus Diarrhea), IBR (Infectious Bovine Rhinotracheitis), PI3 (Parainfluenza-3) and BRSV (Bovine Respiratory Syncytial Virus), and often contain bacterial components as well. Accurate diagnosis of the cause of respiratory disease outbreaks in calves or adult cattle can be extremely difficult as there are often complex interactions of bacteria and viruses. This makes the results of vaccination in the face of a disease outbreak unpredictable. For this reason a proper preventive vaccination schedule for calves and adult animals is required.

Heifers should be vaccinated at 4 - 6 months of age with a combined respiratory disease complex vaccine. Two doses, 2 - 4 weeks apart, are always required. Outbreaks of respiratory disease occur on some farms in calves younger than 4 months of age and therefore require earlier vaccination. During this period many calves will still have colostral antibodies from their mothers. These antibodies often interfere with immunization. It is therefore essential that calves vaccinated before 4 months of age be re-vaccinated with the full two-dose course at about 6 months of age. Booster vaccinations are then given on an annual basis.

Annual vaccination of the adult herd is often done in the fall since respiratory disease in older cattle commonly occurs in fall and winter, associated with confinement of the herd. In some herds, annual respiratory disease boosters are given at drying off to try to improve protective levels of antibody in the colostrum and protect the calves.

### Respiratory Disease Vaccine Components

BVD vaccines. Modified live virus (MLV) and killed vaccines are available. Many veterinarians prefer to use the killed vaccines because they will not cause abortions in pregnant cows which are in contact with MLV vaccinated calves, and will not precipitate mucosal disease in calves that were infected with BVD while still in the uterus. Killed BVD vaccine is essential for pregnant cattle.

### IBR vaccines

There are MLV, killed and intranasal vaccines. The intranasal vaccines can be given very early because they are not affected by colostral antibodies. They also give protection within a few days because

they stimulate interferon production as well as antibody production. Protection is not as long lasting as with the MLV vaccines, which to all intents give life-long immunity, but may cause abortions if given to pregnant cattle. The killed vaccine requires two doses and annual boosters. To protect large groups of dairy calves, many producers use the intranasal vaccine in young calves, at 1 - 4 weeks of age, and then MLV vaccine given in the muscle at 3 and 6 months of age. Avoid using a live vaccine against IBR if animals are suffering from pinkeye, because it can make the pinkeye symptoms much worse.

### PI3 vaccines

PI3 infections are sub-clinical but allow other agents to become established in the lungs. The vaccines that contain PI3 are primarily directed toward protecting against IBR, BVD or BRSV, and so PI3 is simply included in the vaccination schedule for these viruses.

### BRSV vaccines

BRSV is now recognized as an important respiratory disease virus causing severe outbreaks of disease in adult cows and in groups of calves, particularly housed calves. Both MLV and killed vaccines are available. Two doses are always required to establish immunity and annual boosters are required because immunity does not last very long.

### Pasteurella vaccines

Pasteurella killed bacterins, and modified live vaccines are available, as are newer vaccines directed against Pasteurella toxins. How well they work under field conditions is a matter of controversy.

### Haemophilus somnus vaccines

*Haemophilus somnus* pneumonia looks the same clinically as Pasteurella pneumonia. The *H. somnus* bacterins require two doses initially and are frequently given in a combined vaccine with the respiratory virus vaccines.

### Clostridial Vaccines

In many parts of Indiana, particularly in the southern part of the state, vaccination against blackleg with a vaccine containing *Clostridium chauvoei* and *Clostridium septicum* is essential. These vaccines are very effective. Only one dose is required and may be given as early as one week of age, but are usually given before calves are turned out to pasture. Vaccines with a dose volume of 2 ml. are preferred because they are

less likely to cause injection site abscesses than those which specify a 5 ml. dose.

### **Leptospirosis Vaccines**

If leptospiral abortion is a problem, leptospira vaccines are essential. These are bacterins. Calves must be vaccinated twice at 4 - 6 months of age to establish primary immunity. Boosters should be given at least every six months. Booster doses which are given once a year, combined with the respiratory disease booster vaccination, are not being given frequently enough. On some farms where the challenge is high, leptospiral vaccines need to be given four times per year.

### **Staphylococcal bacterins for *Staphylococcus aureus* mastitis.**

These vaccines are susceptible to strain differences and do not prevent new infections from occurring. They may be useful in preventing the worst expression of clinical disease, especially acute gangrenous mastitis. Control of *Staph. aureus* mastitis requires a mixture of teat dipping, dry cow treatment, appropriate culling, milking machine maintenance and perhaps changes to the order in which cows are milked. Vaccination should only be seen as an adjunct treatment.

### **Wart vaccines**

May hasten recovery, unless the warts are on the teats. Try and give the vaccine before the animals recover on their own!

## **VACCINATION FAILURES**

These can occur for a number of reasons:

1. Too much dependence on vaccination to solve management problems. Vaccines generally only work if other management methods to reduce disease are implemented.
2. Failure to give a proper primary course of killed vaccines 2 - 4 weeks apart, as specified by the manufacturer.
3. In the case of leptospirosis: not giving the booster doses often enough.
4. Not establishing a correct diagnosis, and consequently using the wrong vaccine.
5. Strain differences in the disease causing agents, e.g., BVD, pinkeye, *Staph. aureus* mastitis.
6. Improper storage of live vaccines.

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