

# Vaccinations for the Beef Cow Herd

Vaccination programs for beef cow herds are designed to protect animals in the herd against disease caused by infectious organisms, such as viruses or bacteria. Vaccines contain killed or modified live organisms which do not cause disease but stimulate the animal's immune system to mount a response. The immune system will then "remember" how to mount a response against the organism if it is infected with that organism later. A vaccine cannot prevent infection but will increase the animal's ability to throw off the infection or lessen the severity of the disease.

The majority of cattle vaccines are injected, although some may be given by other routes, such as intranasal or oral. Although antibiotics, such as penicillin or tetracycline, are also often administered by injection, treating an animal with one of those drugs is not a vaccination.

## Types Of Vaccines

Animal health product manufacturers go to great expense to obtain approval for vaccines from the U.S. Department of Agriculture. They must prove that the vaccine is safe and that it will do what the label claims it will do.

Although vaccine trade names can be confusing, the label will always specify which diseases and microorganisms the vaccine provides protection against. Sometimes different terms used in the name can be confusing as well. Terms such as *4-way*, *5-way*, *7-way*, or *8-way* do not refer to any particular type of vaccine, but rather to the number of different subtypes of a microorganism in a vaccine. These terms are most often used for leptospirosis or clostridial

disease vaccines, which contain several different subtypes of the *Leptospira* or *Clostridium* organisms. The herd veterinarian will know which types of vaccine best fit the herd's management plan.

## Modified Live Or Killed Vaccines

Most vaccines contain either "modified live" or "killed" organisms. Modified live vaccines, both viruses and bacteria, replicate themselves in the animal after injection. This has been termed a "controlled infection." Because the organisms have been "modified," they do not cause the disease but will stimulate the immune system. Modified live vaccines are mainly available for diseases caused by viruses, such as infectious bovine rhinotracheitis (IBR).

Killed vaccines contain organisms or subunits of organisms which do not replicate or reproduce themselves in the animal after injection. Killed vaccines contain an adjuvant, or an added substance, which further stimulates the immune system to respond to the vaccine challenge.

In general, modified live vaccines stimulate a longer lasting immunity than killed vaccines. However, some modified live virus vaccines can cause abortion in pregnant cows. In addition, some modified live vaccines are not approved in calves nursing pregnant cows because of the slight possibility that the calves could temporarily shed the vaccine virus and infect the cows. Modified live vaccines can be used in weaned calves, including replacement heifers. If a vaccine is used correctly, whether it is modified live or killed, it will increase the animal's resistance to disease. The herd veterinarian can pro-

vide valuable advice about which vaccines best fit the herd's situation.

Although vaccines will not cause the disease they are supposed to protect against, some animals may have a fever temporarily after vaccination. Some may have swelling and soreness at the sight of injection. In some cases, animals may go off feed and decrease milk production for a few days.

## Booster Vaccinations

For young animals being vaccinated for the first time, a second or booster vaccination is often required a few weeks after the first or primary vaccination. A booster vaccination is usually required for killed vaccines that do not replicate in the animal once they are injected. The label directions will indicate when and if a booster vaccination is required. Failure to give the booster at the proper time could result in an incompletely protected adult animal even if that animal is vaccinated every year thereafter.

The time between the primary and booster vaccinations is of interest to beef producers. Management considerations make it difficult or impossible for some producers to booster vaccinate within the time span called for on the label, which is often from 3 to 6 weeks after primary vaccination. The herd veterinarian can answer questions about the timing of booster vaccinations.

When USDA approves a vaccine, it does so only for the label directions which were tested by the manufacturer. Exceeding the time span called for on the label may not make a vaccine ineffective, but it is important to follow label instructions as closely as possible.

## Proper Handling Of Vaccines

The best vaccine program can fail if the product is damaged by improper handling. For example, if the label says to store a vaccine at 35° to 40° F, the vaccine should be refrigerated. Vaccines should not be allowed to freeze, nor should they be stored in direct sunlight.

Most modified live vaccines must be reconstituted by adding sterile water to a dehydrated "cake" in a separate sterile vial. Once the water is added, the vaccine organisms are fragile and will be "live" for only a short time. As a rule of thumb, only reconstitute enough vaccine to be used in 45 to 60 minutes. Use a cooler or other climate-controlled storage container to protect reconstituted vaccines from extremes of cold or heat and from sunlight.

Keep needles and syringes clean to avoid infections at the site of injection. Do not use disinfectants with needles and syringes used for modified live vaccines. Even a trace or film of disinfectant in a syringe or needle can kill the live organisms and make the vaccine worthless. Use mild soap rinsed thoroughly with hot water to clean injection equipment used with modified live vaccines. You can use a mild disinfectant rinsed with water to clean needles and syringes used with killed vaccines.

**Do not** mix different vaccines together in one syringe or combine other injectable drugs into the same syringe with vaccines. Although this method has been advocated as a method of reducing the number of injections, it will inactivate the vaccine because of incompatibilities with the other compounds.

## Method Of Injection

In general, the preferred site for injection is in the neck, both for intramuscular (IM) or subcutaneous (SQ) injections (See figure). Intramuscular injections of some

products, in particular clostridial (blackleg) vaccines, can cause significant muscle damage. Avoid the top butt or rump of the animal. Injection site reactions there will cause damage to a valuable beef product. This muscle damage costs the beef industry millions of dollars a year from lost product and lower calf prices.

## Importance Of Nutrition

Vaccination alone will not insure a healthy herd. In order for a vaccine to work, the animal's immune system must be able to respond to it, and for an immune system to respond, an animal must receive proper nutrition. Proper nutrition includes energy and protein as well as mineral supplementation.

Some calves which have been properly vaccinated with excellent vaccines have still died in the feedyard because their pre-shipment mineral nutrition was deficient. Minerals such as copper, selenium, and zinc are required in very small amounts in the diet; however, if the forage is deficient in some of those elements and they are not supplemented in a diet or a free choice mineral mix, the immune system may not function correctly. Review your forage, supplement, and mineral nutrition programs with your county Extension agent and veterinarian to insure you are meeting the herd's needs.

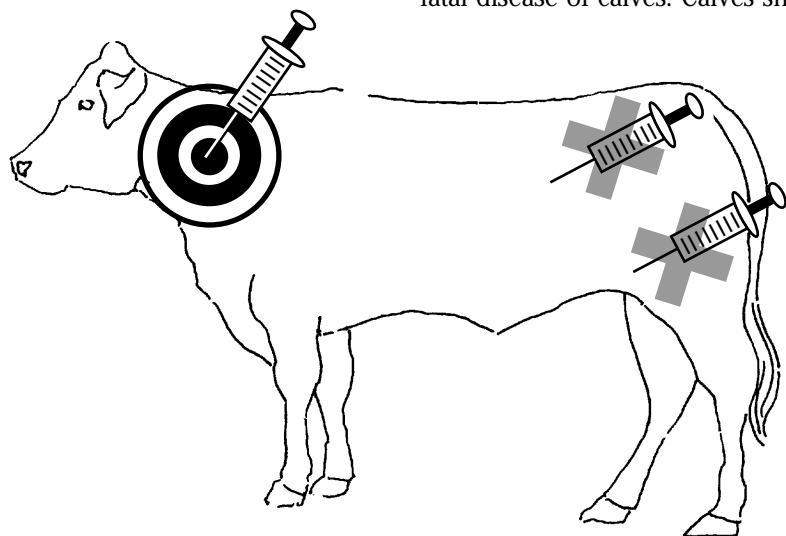
## Vaccinating For Diseases That Are A Routine Threat

Vaccines are available for many disease conditions. However, many diseases are not a routine threat to most beef herds, and some vaccines are not sufficiently effective to justify their use. Therefore, only a few vaccines are included in a routine vaccination schedule. The Glossary Of Conditions And Terms on pages 4 and 5 discusses both routine and not-so-routine infectious diseases and vaccines for them.

## Vaccinating The Right Animal At The Right Time

Use Circular ANR-968A, "Beef Cow Herd Planning Calendar," to schedule vaccinations and other herd health procedures recommended by the veterinarian into the yearly management scheme (See Example: Beef Cow Herd Vaccination Planning Calendar for a fall calving herd).

First, write down the breeding and calving seasons. Then schedule vaccination and other management events. Most recommended vaccines need to be given at times which are either dependent on the age of the animal or the stage of its reproductive cycle. For example, blackleg is a rapidly fatal disease of calves. Calves should



Use neck for injections. Do not inject in rump and leg.

be vaccinated for blackleg by 3 to 4 months of age when the temporary immunity from the dam has declined and the calf's immune system can respond to the vaccine.

## Vaccinations For Different Animals In The Herd

Two main categories of animals should be vaccinated to prevent infectious disease in the cow herd:

- Calves (suckling, preweaning, postweaning).
- Breeding animals (replacement heifers, bred replacement heifers, cows, and bulls).

### Calves

- 4-way or 7-way clostridial (blackleg)

Vaccinate at 3 to 4 months old (commonly called "branding time" in western states); give a booster according to label a few weeks later. Revaccinate at 4 to 6 months old if first vaccination was given before 3 months old.

- IBR/PI<sub>3</sub>/BVD/BRSV

May be recommended in herds at risk of pneumonia in nursing calves. Some veterinarians may recommend an intranasal IBR/PI<sub>3</sub> instead of the injectable IBR/PI<sub>3</sub>/BVD/BRSV combination for young calves at the same time as blackleg vaccination.

- Calfhood Vaccination for Brucellosis

For 4- to 10-month-old heifers, if recommended by herd veterinarian.

## Older Calves Before Weaning

In order to add value to calves sold at or after weaning and to increase the health in retained ownership calves going to the feedlot, the following vaccinations should be considered:

- IBR/PI<sub>3</sub>/BVD/BRSV (viruses causing pneumonia/sickness)

Give primary vaccination before weaning; booster vaccinate a few weeks later at or before weaning. Follow label directions for time between vaccinations. Couple this vaccination program with weaning 30 to 45 days before shipment.

The following vaccinations may also be recommended before weaning. (Consult with your veterinarian. Follow vaccine label carefully.)

- *Haemophilus somnus*
- *Pasteurella haemolytica* (leukotoxoid-type vaccine)

## Breeding Animals

Replacement heifers, cows, and bulls should be vaccinated before the breeding season to keep resistance high. The following vaccinations are usually recommended:

- Leptospirosis 5-way
- Vibriosis (*Campylobacter fetus*)

Give Lepto and Vibrio twice a year, once before breeding and once at calf working or pregnancy check; they are available as a combination vaccine made by many different companies.

- IBR/PI<sub>3</sub>/BVD/BRSV

Replacement heifers: Use a modified live virus vaccine after weaning and before breeding.

Pregnant cows: Use a product which is approved for them. Some modified live virus vaccines may cause pregnant cows to abort.

- 7-way clostridial (blackleg) booster vaccination

Pregnant replacement heifers: Give a booster vaccination before their first calves are born to increase immunity passed on to calf through colostrum.

Mature cows: A booster with clostridial vaccine before calving is not routinely recommended.

## Purchased Breeding Herd Additions

These animals should be vaccinated the same as breeding animals already in the herd. Depending on the history available from the prior owner or sale, the following vaccinations may be necessary:

- Leptospirosis 5-way
- Vibriosis (*Campylobacter fetus*)
- IBR/PI<sub>3</sub>/BVD/BRSV
- 7-way clostridial (blackleg) booster vaccination

## Other Possible Vaccinations

When calfhood diarrhea (scours) or sudden death has been a herd problem, work with the herd veterinarian to arrive at a diagnosis for the cause. Vaccinate for one of the following diseases only when a diagnosis confirms it has caused the problem in the past.

- "Scours vaccine" (may contain a combination of coronavirus, rotavirus, *E. coli*, and/or *Clostridium perfringens*)

Can be administered to late-pregnant dams to prevent diarrhea in their calves. Some may be labeled for oral administration to calves immediately after birth, before ingestion of colostrum. Follow label directions.

## Conclusion

Work closely with a veterinarian to customize a vaccination program for your cow herd. A veterinarian may add or delete vaccinations that are generally recommended for most herds. In addition, a veterinarian can offer objective advice on specific vaccine products. By being involved in the design of the herd health production calendar, a veterinarian will be better able to help prevent disease and deal with it if it occurs.

# Glossary Of Conditions And Terms

**Anaplasmosis:** An often fatal infectious disease of cattle caused by a microscopic parasite of red blood cells, spread by horsefly bites or by reusing needles or instruments between animals. The risk of the disease is low in most areas but may be higher near river systems. Vaccines are available, but unless the risk is high, a routine vaccination for anaplasmosis is not recommended.

**Bacterin:** A bacterial vaccine.

**Blackleg:** A highly fatal disease of young cattle caused by one type of *Clostridium* bacteria. See Clostridial disease.

**BRSV (Bovine Respiratory Syncytial Virus):** A virus which can cause severe, acute respiratory disease especially in young cattle.

**Brucellosis:** An infection resulting in abortion in females and inflammation and damage to the testicles in males, caused by the bacterium *Brucella abortus*. Also known as Bang's disease. See Calfhood Vaccination.

**BVD (Bovine Virus Diarrhea):** A disease caused by a virus, resulting in numerous problems, such as damage to the digestive and immune systems, pneumonia, abortions, calf deformities, and others. Incomplete vaccination programs, such as those omitting a needed booster vaccination, have led to BVD outbreaks in some herds.

**Calfhood Vaccination (Official Calfhood Vaccination):** Vaccination with *Brucella abortus* Strain 19 for heifers between 4 and 10 months old. The best age is 5 months. Calfhood vaccination must be by a federally accredited veterinarian (Most large animal veterinarians are federally accredited). Vaccination is necessary for heifers being shipped into some states; therefore, many sales require that all heifers sold be calfhood vaccinated so as not to restrict the potential market. Official calfhood vaccinates are marked in the right ear with an official orange

ear tag and a special tattoo, denoting the quarter and year of vaccination. The decision to have heifer calves vaccinated for brucellosis should be based on the advice of the herd's veterinarian and depends on the marketing plan of the herd.

**Clostridial disease:** Fatal disease of young cattle caused by one of the *Clostridium* bacteria. Blackleg is the most well known, but other clostridial diseases are also highly fatal. Currently, the most commonly used clostridial vaccination in cattle is the 7-way type which protects against *Clostridium chauveoi* (blackleg), *Clostridium septicum* and *Clostridium sordelli* (malignant edema), *Clostridium novyi* (black disease), and three types of *Clostridium perfringens* (enterotoxemia).

**Coronavirus:** A virus which can cause diarrhea (scours) and dehydration in young calves. Some "scours vaccines" given to pregnant females will contain coronavirus. Vaccination of the pregnant dam raises the level of antibodies to coronavirus in her colostrum, the first milk she produces which is suckled by the calf after it is born. Antibodies from colostrum provide the calf's immunity for the first few weeks and months of life.

**E. coli:** A bacterium which can cause a life-threatening infection and diarrhea (scours) in newborn calves. Some "scours vaccines" given to pregnant females will contain *E. coli*. Vaccination raises the level of antibodies to *E. coli* in the dam's colostrum milk suckled by the calf after it is born. Antibodies from colostrum provide the calf's immunity for the first few weeks and months of life.

**Haemophilus somnus:** A bacterium which can cause respiratory, nervous system, and reproductive diseases. Vaccination may be recommended for breeding animals. On some dairy farms pregnancy rates may have increased following initiation of a vaccination program for *Haemophilus somnus*.

**IBR (Infectious Bovine Rhinotracheitis):** A disease caused by a virus, resulting in respiratory signs, reproductive failure, and abortions. Sometimes called "red nose." Often implicated as an infection which initiates the shipping fever complex. Many IBR vaccines include the IBR/PI<sub>3</sub>/BRSV/BVD virus complex.

**Intramuscular (IM):** Injection in the muscle, that is with a needle penetrating directly into the muscle usually at least 1 inch.

**Leptospirosis (5-varieties):** A bacterium causing abortion in pregnant females and sickness in calves. The five varieties include: *hardjo*, *icterohaemorrhagiae*, *canicola*, *pomona*, and *grippotyphosa*. Breeding animals should be vaccinated with a 5-way Lepto vaccine at least once a year before the breeding season. Booster vaccination later in the year is recommended. Leptospirosis vaccine is often combined with Vibriosis vaccine.

**Pasteurella haemolytica:** A bacterium causing "shipping fever" pneumonia, often after infection with one of the respiratory viruses such as IBR, PI<sub>3</sub>, BRSV, or BVD. Newer vaccines containing the leukotoxin portion of *Pasteurella haemolytica* are more effective than the older vaccines, which did not provide adequate protection.

**Pinkeye (Infectious Bovine Keratoconjunctivitis, or IBK):** An infection of the eye caused by infection with the bacterium *Moraxella bovis*, spread by flies. Higher incidence of pinkeye may occur in herds not vaccinated for the IBR virus. Pinkeye vaccines are available. Good results with some of these vaccines have been claimed; however, published trials have not proven their effectiveness.

**PI<sub>3</sub> (Parainfluenza virus):** A virus which can cause respiratory disease, sometimes implicated as an infection which initiates the "shipping fever" complex.

**Rotavirus:** A virus which can cause diarrhea (scours) and dehydration in young calves. Some “scours vaccines” given to pregnant females will contain rotavirus. Vaccination of the pregnant dam raises the level of antibodies to rotavirus in her colostrum, the first milk she produces which is suckled by the calf after it is born. Antibodies from colostrum provide the calf’s immunity for the first few weeks and months of life.

**Subcutaneous (SQ or subq):** Injection under the skin, not deep into the underlying muscle. If approved as a route of injection on the vaccine label, subcutaneous injection is just as effective as the intramuscular route, and may avoid muscle damage.

**Trichomonas:** A protozoan organism transmitted during breeding which causes failure of early pregnancy, an extended breeding season as females come back into heat, and, less commonly, abortion. Although a vaccine is available to raise the resistance to *Trichomonas* in the breeding herd, unless the condition has been positively diagnosed, the vaccine is not routinely recommended.

**Vibriosis:** A bacterial disease caused by *Campylobacter fetus venerealis*, resulting in failure of early pregnancy and an extended breeding season as females come back into heat. Vaccinate breeding bulls and females at least once a year before the breeding season. Vibriosis vaccine is often combined with Leptospirosis in one vaccine.



ANR-968

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Example:

### BEEF COW HERD VACCINATION PLANNING CALENDAR

(FALL CALVING)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
COWS		Vaccinate: • Brucella • IBR/PI3/IBVD/BSV • Lepto/Vibrio • Calfhood vaccines for heifers		Vaccinate: • Brucella • IBR/PI3/IBVD/BSV	Vaccinate: • IBR/PI3/IBVD/BSV • Lepto/Vibrio				Calving Season • Brucella, east Nile, any other, important others			
DRYING HEIFERS	BREEDING SEASON								Vaccinate: • IBR/PI3/IBVD/BSV • Lepto/Vibrio			BREEDING SEASON
BRED HEIFERS		↙			Check check vaccinate: • IBR/PI3/IBVD/BSV • Lepto/Vibrio				Calving Season • Lepto/Vibrio			
COWS	BREEDING SEASON				Pre-check vaccinate: • IBR/PI3/IBVD/BSV • Lepto/Vibrio				Assess Body Condition Calving Season • Lepto/Vibrio			BREEDING SEASON
BULLS	BREEDING SEASON								Calving Season • Lepto/Vibrio			BREEDING SEASON

The specific events and procedures in this example calendar are for illustration only. Consult closely with herd veterinarian to plan the events and procedures for your herd.

Vaccinate:  
• IBR/PI3/IBVD/BSV  
• Lepto/Vibrio