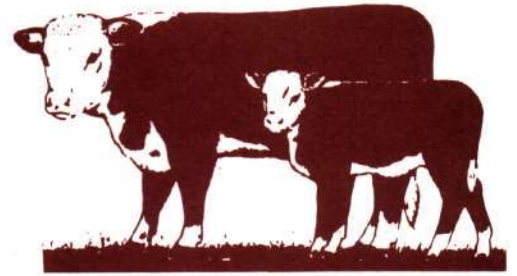


MICHIGAN BEEF PRODUCTION



COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

Beef Cattle Vaccinations

*Dr. Frank E. Woodson, West Virginia University and
Dr. Harlan D. Ritchie, Michigan State University*

The main emphasis in reducing disease-caused production losses *must* be on prevention. This gives the best protection and savings per dollar invested. Once disease occurs, losses are invariably incurred. Efforts then must be directed toward minimizing losses and salvaging some value from the affected livestock. Although usually worthwhile, this often entails additional costs for drugs and assistance.

Vaccination is true prevention. If effective vaccines are properly administered, there is no better, cheaper method of prevention. Every recommendation made herein is based upon careful consideration of such factors as the presence of a disease in our area, the risk of infection occurring in a herd, the extent of expected losses if infection occurs, and the most effective method and the cost of prevention. The procedures recommended are often modified to adapt to our general management, geographic, and climatic conditions. More specific modification may be necessary to adapt to specific conditions existing on individual farms. Direct experience and local knowledge will dictate the required modifications.

Vaccination to prevent the following diseases is recommended:

1. BLACKLEG AND MALIGNANT EDEMA VACCINATION

Blackleg can cause sudden deaths and heavy losses in cattle between 6 months and 2 years of age. Very young calves and mature cattle are relatively resistant to infection. Malignant edema can affect animals of

any age but occurs most commonly in young animals following unsanitary castration or vaccination. Infection can also occur following calving or wounds caused by penetrating objects. The causative organisms are found almost everywhere in fertile soil and the intestinal tracts of herbivorous (forage eating) animals. So the potential for loss exists in every herd. In certain areas or herds, losses can be severe and often occur every year. Too many losses from these diseases do still occur even though they are almost fully and cheaply preventable by vaccination.

Combined vaccines for simultaneous immunization against both diseases are readily available and cost about the same as single vaccines against one of these diseases. Use of the combined vaccine is recommended. These two vaccines are also available mixed with pasteurilla bacterin. Many producers use this triple bacterin. Routine use of the pasteurilla bacterin in cow-calf herds is not recommended because it gives poor immunity and can occasionally cause a severe reaction which may result in death. Pasteurella bacterin may be useful in feeder calves prior to movement and in feedlots.

All calves should, ideally, be vaccinated no earlier than 3 months of age. This will assure the best immunity in the majority of calves. A good time to vaccinate all calves is just before the herd is turned out to pasture. Some late born calves may not be old enough at this time to develop a solid lasting immunity. These should be revaccinated after they are over 3 months old to assure maximum protection. In herds which are easily accessible when on pasture, vaccination may be

delayed up to the end of May in order to have a higher percentage of calves nearer to 3 months of age.

Following the initial vaccination, all calves held over as replacements should be revaccinated in the fall at or shortly after weaning. Previously vaccinated animals 2 or more years old do not require revaccination for blackleg. Immunity against malignant edema is not durable. Annual revaccination will be required if this disease is a special herd problem.

2. LEPTOSPIROSIS (LEPTO)

Lepto is a bacterial blood infection which can occur in most mammals, including all domestic animals and man. Although lepto is not a true venereal or breeding disease, the main sign of infection is abortion or birth of pre-mature, dead or weak calves. This occurs because the fetus is weakened or dies as the result of high fever or direct infection in the uterus. On rare occasions, Lepto may cause animals (especially young heifers) to be obviously sick and void bloody urine.

As the animal recovers from the blood infection, the bacteria pass through the kidney to the urine where they establish a lingering infection. The bacteria may remain for several months in cattle or even live in certain other animals. These animals are then "carriers" of the disease and constantly pass infective bacteria in their urine. Infection is passed to susceptible animals when they consume feed or water contaminated with urine from such carriers. For cattle, carriers are most commonly other cattle but hogs, dogs, rats, mice, deer and other wild animals are potentially important sources of infection.

To further complicate this disease, there are numerous types of this bacterium, several of which are known to cause losses in cattle. *Leptospira pomona* causes the majority of losses in cattle. Better diagnostic methods have recently found significant incidence of *L. hardjo* in cattle in much of the Northeast. *L. grippotyphosa* also results in losses in certain areas. *L. canicola* and *L. icterohemorrhagiae* were formerly thought to be important in cattle but current evidence tends to minimize their importance. Effective vaccines are available for all the above types of leptospire. *L. wolffi* and *L. ballum* are also found in cattle, but little is known of their incidence and ability to cause loss. No vaccines are yet available for these types.

Immunity from vaccination is theoretically dependable for 12 to 18 months under ideal conditions. In individual animals—or if poor quality vaccine, or improper vaccination technique is used, immunity may be significantly less durable. Practically, we cannot rely on effective immunity for more than 12 months, so annual revaccination of all breeding cattle is necessary.

Lepto vaccination recommendations are as follows:

Minimum protection—Recommended for every herd. Annually vaccinate with *I. pomona* bacterin. This should provide about 70% protection from lepto losses.

Optimum protection—Recommended for herds and areas in which other lepto types have been found or where better protection is desired. Annually vaccinate with GHP bacterin (contains *L. pomona*, *L. hardjo* and *L. grippotyphosa*). This combined vaccine will provide an estimated 80% to 90% protection against lepto infection. Vaccination for *L. canicola* and *L. icterohemorrhagiae* is not routinely recommended but may also be used in herds where losses from these types have been diagnosed or where maximum possible protection is desired.

Time to vaccinate—at the beginning of breeding season is strongly recommended. May be before, after or as breeding season starts. This boosts immunity to produce a high level of protection throughout gestation—the period when abortion losses occur.

Many producers have customarily vaccinated in the fall at or just after weaning time. Vaccination at this time is certainly better than not vaccinating at all, but it should be recognized that if, for any reason, effective immunity does not last 12 months then protection will not be continuous and lepto infection could occur.

3. INFECTIOUS BOVINE RHINOTRACHEITIS (IBR OR REDNOSE) AND PARAINFLUENZA 3 (PI₃)

These are caused by viruses and are part of the shipping fever complex we hear so much about in feeder calves. Less well known is the fact that these same viruses cause respiratory disease in calves and even adults in cow-calf herds where there has been no movement of animals and little apparent stress other than weaning. In addition, the IBR virus has been increasingly incriminated as the cause of other problems local beef-producers have been experiencing. Examples of these problems are "Winter" pinkeye, failure of cows to settle quickly, abortions, and the birth of stillborn or very weak calves which usually die unless given intensive nursing care and supportive treatment. Blood testing of numerous herds has shown that IBR and PI₃ infection have occurred in almost every herd tested.

As a step toward preventing some of these problems, vaccination is now recommended for IBR and PI₃. Although the modified live virus (MLV) vaccines will often give permanent immunity, there is sufficient evidence to suggest that booster shots should be given every 2 to 3 years in problem areas. **Intra-muscular MLV vaccines cannot be given to pregnant cattle without danger of infecting the fetus and causing abortion.**

Therefore, they should be administered only to open cows and heifers at least 3 weeks before breeding. Intranasal type MLV as well as killed virus vaccines have been proven safe for use in pregnant cattle.

Annual vaccination of all replacement heifers between weaning and first breeding will gradually build an IBR immune herd. If IBR and/or PI₃ are diagnosed as the cause of losses in the adult herd, then vaccination is recommended for the entire herd with intranasal MLV or killed virus vaccine immediately or with intramuscular MLV vaccine when the herd is open.

4. BOVINE VIRUS DIARRHEA (BVD)

This virus has also been found, through blood testing, to be widespread in West Virginia beef herds. The full extent of losses caused by it are not yet known. Sporadic deaths from severe diarrhea have been diagnosed in both adult and immature cattle. BVD can cause outbreaks of severe scours in nursing calves. BVD virus can infect pregnant cattle without producing any sign of diarrhea, passing to infect her fetus resulting in abortion, stillbirth or birth of a live calf with nervous damage manifested by lack of sucking instinct or poor control of leg or head movements. In addition, this virus causes a severe lameness with swelling just above the hoof. Also, a chronic "founder" type abnormal hoof growth has been attributed to damage from previous BVD infection.

MLV vaccines against BVD are available and produce permanent immunity. However, such vaccines do not yet include all strains of the virus; therefore vaccination immunity may not be complete. Recent information indicates that BVD vaccines may not be effective if administered to calves under 8 months of age. Combination BVD, IBR, PI₃ vaccines are widely available.

Annual vaccination of all replacement heifers is recommended to build an immune herd. If BVD causes losses in the adult herd, then vaccination of the entire herd when open is recommended.

All regulating agencies strongly recommend that live virus vaccines be administered by or under the supervision of a licensed veterinarian. This recommendation is made for the benefit of producers because such vaccines are not only potentially dangerous to use but also are extremely delicate, requiring extra care in handling and administration in order to produce good immunity. Modified live viruses are easily destroyed by chemical disinfectants, sunlight, improper temperatures, etc. A MLV vaccine that is dead is worthless. Practicing veterinarians are the usual and best source of MLV vaccines.

A killed BVD vaccine is now available, which is safe to use on pregnant cows as well as on young calves. However, it is more expensive than MLV vaccine.

5. BRUCELLOSIS (BANG'S DISEASE; CONTAGIOUS ABORTION)

Bovine females sold for breeding purposes in some states, such as Michigan, are required by law to have been calftood vaccinated for Bang's disease. The age for vaccination is 2 to 7 months. In other states, vaccination may be recommended but not required by law. Buying or selling non-vaccinated heifers in those states, where it is required, is a punishable offense and should not be taken lightly; when purchasing females, you should insist upon proof of calftood vaccination such as a verification certificate issued by the state or an official brucellosis tattoo or tag in the ear.

Male calves should not be vaccinated because they tend to show a positive reaction to the Bang's test for a much longer period of time than females. Generally speaking, heifers vaccinated at the proper age (2-7 mos) do not react to the Bang's test after 20 months of age. When vaccinated bulls are tested for Bang's, they may show a positive reaction for several years which would prevent their sale as breeding animals.

Abortion during the latter half of pregnancy is the most common symptom of brucellosis. In herds with a problem, retained placentas and enlarged testicles are also symptomatic of the disease. The causative agent is the *Brucella abortus* bacterium, which may be transmitted orally, venereally, or through the milk of infected cows. Diagnosis of the disease involves taking a blood sample and conducting an agglutination test. The same blood sample can be used to test for leptospirosis.

6. VIBRIOSIS (VIBRIO)

Although this reproductive disease is more common in the West, it has been on the increase in the Eastern states in recent years. Vaccination is recommended in herds where the disease is a problem or in areas where it is likely to become a problem. The vaccine is a killed product (bacterin), which means that it is safe to use on pregnant cows. However, it is believed that stronger immunity will result if females are vaccinated no later than 2 weeks prior to the breeding season. Each breeding-age female should receive two injections, 2 weeks apart, the first year, and a single injection in subsequent years.

Vibriosis is caused by a bacterium, *Vibrio fetus*, which is transmitted primarily by infected bulls. Even though the disease is spread through bulls, they are not affected by it. The symptoms are manifested in the cow herd in the form of repeat breedings (4 to 8 services), irregular heat cycles, low conception rates, low calving percentages, late calvers, strung-out calf crops, and infrequent abortions (3 to 5% during mid-pregnancy). Accurate diagnosis is more difficult than with leptospirosis and brucellosis.

7. TYPES OF VACCINES

Generally speaking, there are two basic types of vaccines: (1) killed (inactivated) and (2) live. Because killed products cannot be further inactivated, they can probably withstand greater abuse, such as inadvertent storage in a coat pocket. Live vaccines are very stable in their freeze-dried condition, but can be readily killed once they are reconstituted with diluent, as noted below. Common examples of killed vaccines are bacterins for leptospirosis, vibriosis, blackleg, malignant edema, *E. coli* and hemophilus. Commonly used live products are the modified live virus vaccines for IBR, BVD, PI₃, rota, and corona.

8. PROPER USE OF VACCINES

- a. Check label to make certain vaccine is not badly out of date. USDA licensed vaccines that are properly stored can probably be used for several months after the expiration date.
- b. Follow instructions concerning storage and refrigeration.
- c. Once they have been reconstituted, modified live virus (MLV) vaccines, such as IBR, BVD, and PI₃, are unstable and should be used immediately. Furthermore, the following precautions should be noted:
 - (1) Reconstituted live vaccines can be very easily killed with direct sunlight, heat, freezing-thawing, detergents and disinfectants.
 - (2) Ideally, reconstituted live vaccine should be used up within 2 hours.
 - (3) Use only new, disposable syringes when adding diluent to reconstitute the freeze-dried live vaccine. If an old, contaminated syringe is used, the vaccine may become inactivated.
- d. Use clean, sterile needles to avoid infection; new disposable needles are preferred.
- e. Use proper length and gauge of needle, depending upon viscosity of product and site of injection.
- f. Read instructions to determine how product is to be administered (intramuscular, subcutaneous, intranasal, oral, etc.).
- g. Consult your local veterinarian regarding other details on the use of vaccines.

9. SUMMARY OF BEEF HERD VACCINATION PROGRAM

- a. Replacement heifers, from 9 mos of age to no later than 3 weeks prior to first breeding season:
 - (1) IBR-PI₃
 - (2) BVD (consult veterinarian first).
 - (3) Leptospirosis
 - (4) Vibriosis (two injections 2 weeks apart).
- b. Adult cow herd in fall or no later than 3 weeks prior to breeding season in spring:
 - (1) Annual leptospirosis injection.
 - (2) Annual Vibriosis injection.
 - (3) For pregnant cows in fall, vaccinate annually in the fall with killed or intranasal IBR-PI₃. For open cows prior to breeding season, vaccinate every 1-3 years with intramuscular IBR-BVD-PI₃.
- c. Female calves, 2 to 7 months of age:
 - (1) Blackleg and malignant edema.
 - (2) Brucellosis.
- d. Male calves, 3 to 7 months of age:
 - (1) Blackleg and malignant edema.
- e. In addition to those listed above, the following injections may be indicated depending upon local conditions. Consult your veterinarian for advice. For further details refer to Extension Bulletins E-1686 and E-1687.
 - (1) Scours vaccine to cow herd prior to calving to prevent calfhooed scours. There are two types: one against *E. coli* scours and another against rota-corona viral scours. These two types are now available in a single injection.
 - (2) Selenium-tocopherol ("Bo-Se") injection in newborn calves to prevent white muscle disease.
 - (3) IBR-PI₃, vaccine to calves 3-4 weeks before weaning.
 - (4) Hemophilus somnus vaccine to calves 3-4 weeks before weaning.
 - (5) BVD vaccine to calves 3-4 weeks before weaning (consult veterinarian first).
 - (6) About 3-4 weeks after weaning, give booster injections of those same vaccines given before weaning.

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