

Dairy Herd Vaccination Program

Jodie A. Pennington,
Ph.D.
Extension Dairy
Specialist

Jeremy Powell, DVM
Extension Veterinarian

Introduction

Maintaining an effective animal health program is an essential part of a successful dairy enterprise. Good animal health is vital for maximum production since cattle must be healthy to reach their performance potential. Studies show that two out of three cows are culled from dairy herds for reasons other than low production.

Since each dairy operation is unique, each owner should work with his/her veterinarian to create a herd health plan. Accurate records, including information on medications, vaccinations, wormers, injuries, production, breeding and culling, should be kept on each animal. This information should be used to plan a herd health program. A vaccination program is only a portion of a herd health plan.



Dairy cows need to be healthy to obtain maximum benefits from good feeding.

It is important to implement a sound herd health program before a disease outbreak occurs.

Recommended dairy cattle vaccination programs depend upon the type of operation and the area of Arkansas. Contact your veterinarian to determine specific vaccinations for your area.

Developing a Vaccination Program for Your Herd

A sound vaccination program requires planning and consultation with your herd veterinarian who will be aware of the diseases of importance in your area. The common dairy cattle diseases for which vaccines are available are discussed in Table 1.

Several questions need to be answered before designing a vaccination program: Why? With what? When? How? Identifying and implementing the answers to these questions will help make your vaccination program successful.

Why? Livestock are vaccinated to reduce the economic losses associated with disease. It is usually less expensive to prevent than treat a disease. Many effects of diseases are obvious, such as abortion, diarrhea and respiratory disease. Most diseases can be subtle, showing no outward signs, but can significantly reduce

efficiency of production. Vaccination stimulates the animal's immune system to produce protective antibodies

*Arkansas Is
Our Campus*

Visit our web site at:
<http://www.uaex.edu>

that will help eliminate the invading disease organisms from the animal's body.

Diseases also will have sporadic occurrence; an extreme case is brucellosis. Even though Arkansas is considered brucellosis-free, this does not mean the disease no longer exists in the state. The "free" status can be easily lost if producers become lax with brucellosis testing and vaccination. Also, unvaccinated heifers cannot be sold in Arkansas if they go to a farm in Arkansas for breeding.

With what? There are many vaccine products available on the market. They may be obtained from your veterinarian or purchased over the counter. There is a lot of confusion about which is the best product. The best product is the one that will provide protection from the disease organisms for which your herd is at risk. **Consult with your veterinarian for recommendations.** Most of the products on the market today are high quality and should work well if they are used properly. If the vaccine is purchased over the counter, make sure to read the enclosed instructions regarding the disease organisms that the product contains and how the product should be administered.

It is also important to have confidence in how the vaccine was stored prior to your purchase. If it needs refrigeration and it has been on the loading dock in 90-degree weather, then you don't want it.

The most common vaccines on the market are either **killed or modified-live**. In general, most killed vaccines must be administered twice, two to four weeks apart. It takes approximately four to six weeks after the initial vaccination before the animal's body will be able to respond to exposure to disease. A modified-live vaccine contains the disease organism that has been altered so that it may reproduce but not make the animal sick. The animal can respond to a modified-live vaccine more quickly and only one vaccination is required. Modified-live vaccines are not recommended for pregnant animals since they may give the animal a mild case of the disease and potentially lead to abortion in pregnant cows. Yearly boosters are usually recommended for both modified-live and killed vaccines. There are many new products on the market that are exceptions with regard to frequency of administration. It is critical to read the instructions carefully and follow them.

Table 1. Diseases Included in a Vaccination Program¹

Disease	Symptoms/Diagnosis	Prevention
Clostridium (Blackleg 7-way)	Sudden death with swelling in rear parts of animal.	Vaccination at 2-6 months with two vaccinations 2-6 weeks apart; burn or bury carcasses. Annual booster.
Vibriosis (<i>Campylobacter</i>)	Blood tests; abortions in early pregnancy; several services per conception; irregular heat periods.	Use A.I. vaccination yearly if a problem (used mostly with natural service).
Leptospirosis	Blood tests; abortions any time; high fever, poor appetite; bloody urine, anemia, ropy milk.	Vaccination at 4-6 and 12-16 months plus yearly. Keep cattle from other classes of animals.
Brucellosis	Blood or milk tests; abortions in last third of pregnancy; retained afterbirth; several services per conception.	Calfhood vaccination at 4-12 months; (4-8 months preferred); use A.I.
Bovine respiratory disease complex (BRDC) or shipping fever (<i>Pasteurella</i> , <i>Mannheimia</i> or <i>Haemophilus somnus</i>)	Blood tests; respiratory disease, high fever, nasal discharge, coughing, rough hair coat if severe; can be very mild.	Vaccination at 4-6 and 12-16 months, yearly and before severe stress periods.
Infectious bovine rhinotracheitis (IBR)	Blood tests; respiratory disease, high fever, nasal discharge, off-feed, pneumonia or coughing, pus pockets in the vagina; severe abortions or repeat breeders.	Vaccination at 4-6 and 12-16 months plus yearly. ² A.I.
Bovine viral diarrhea (BVD)	Blood tests; severe diarrhea, abortions, high fever, coughing.	Vaccination at 4-6 and 12-16 months plus yearly. ²
Parainfluenza-3 (PI ₃)	Blood tests; similar to shipping fever, death in young calves; abortions.	Vaccination at 4-6 and 12-16 months. ²
Bovine respiratory syncytial virus (BRSV)	Blood tests; respiratory disease, primarily in heifers.	Vaccination at 4-6 and 12-16 months plus yearly. ²

¹Programs should be based on diseases in herd and area; may vaccinate for other clostridium.

²May be given at 1-2 months.

Table 1. Diseases Included in a Vaccination Program¹ (continued)

Disease	Symptoms/Diagnosis	Prevention
Pneumonia (viral and/or bacterial)	Rapid and difficult breathing, cough, runny nose and eyes.	Good ventilation pulling air away from small calves. Isolate young calves in individual stalls or pens and carefully group to avoid wide range in age. Keep pens or stalls clean and well bedded. Vaccination for related respiratory diseases.
Warts	Crusty cauliflower-like overgrowths of skin.	Good sanitation, vaccination.
Foot rot	A break in the skin or hoof, usually between the toes, allowing bacteria to enter. Rapid progressive lameness, swollen foot, characteristic foul odor.	Clean, dry yards; disposing of foreign materials that might cause a break in the skin or hoof, trim feet, vaccinate if chronic problem.
Ringworm	Gray, crusty patches on skin, usually circular, most often on head and shoulders.	Usually disappears when animals are let out in spring sunshine; vaccinate if chronic problem.
Diarrhea (scours), <u>viral</u> or <u>bacterial</u> (<i>E. coli</i> , <i>Salmonella</i> , <i>Rotavirus</i> or <i>Coronavirus</i>)	Temperature, watery feces, may be cold to the touch, sunken eyes, skin slowly returns to normal after being pinched up.	Feed colostrum at birth. Individual stalls or pens for calves less than 2 months old. Do not overfeed. Do not overcrowd. Vaccination of dams in 3rd trimester with specific agent to build colostral antibodies. Vaccinate calves immediately at birth (Reo-corona virus).
Hairy heel warts (foot warts)	Cows with reddened area on back feet between the toes on the back of the foot; advanced raspberry-like lesions with protruding black hairs.	Dry environment; maintain closed herd; spray feet of infected cows with antibiotic solution such as oxytetracycline; vaccinate.
Anthrax	Blood tests, sudden death with bloody discharges, history in area.	Vaccinate; DO NOT OPEN CARCASSES where death due to anthrax is suspected.
Anaplasmosis	Blood tests, low red blood cell count, membranes pale and yellow, death.	Cleanliness in procedures involving blood; vaccinate.
Trichomoniasis	Blood tests, poor fertility.	Use A.I., vaccinate.
Mastitis	Infection of the mammary gland caused by one of several bacterial organisms. Swollen and painful udder, sometimes causing the cow to go off feed; chronic cases may produce only flaky milk and, in time, result in uneven quarters and slow milking.	Effective dry cow treatment in combination with regular use of a good teat dip after each milking; milking system of proper design and installation maintained regularly; follow well-managed milking procedures; in specific cases, vaccination may be helpful.
Pinkeye	Inflammation of eye; cloudiness of cornea, watery eye with reddening of eyeball and swelling of eyelids.	Good insect control, vaccination, isolate infected animals if possible; treat with antibiotics, commercial sprays, or patches on eye to prevent spread.

¹Programs should be based on diseases in herd and area; may vaccinate for other clostridium.

²May be given at 1-2 months.

When? Deciding when to vaccinate is dependent upon several factors. One needs to be concerned with when the animal (herd) will be at the highest risk for disease exposure. The age of the animal and its state of production are also considered. Reproductively active cows and bulls will be at highest risk for reproductive diseases prior to and during the breeding season.

It was discussed in the previous section that a specific time span is needed to develop protection once the animal has been vaccinated. Vaccination of breeding animals 30 to 60 days prior to breeding season would be optimal for the prevention of reproductive diseases. The best protection against diseases that affect the newborn calf can be found in the colostrum or “first milk.” Vaccination of the cow 30 to

60 days prior to calving will help with the production of high quality colostrum.

Now let's consider the age of the animal. Prior to two months of age, the calf's immune system is immature and cannot respond very well to vaccination. In addition to this, if the calf has received adequate colostrum, the protective antibodies in the milk may actually interfere with a good response to vaccination. Except for scours or the rare outbreak of a respiratory disease, the best time to begin vaccinating calves is after three months of age. Most dairy producers will vaccinate heifer calves at four to six months of age, then boost annually.



Calves should receive colostrum, but the antibodies may interfere with early vaccinations.

How? Good vaccination technique is critical to the success of a vaccination program. This includes the proper handling of vaccines and use of proper, clean equipment.

Vaccines should be kept cool in the summer and kept from freezing in the winter. Modified-live vaccines are sensitive to UV light and should be kept out of the sunlight. Once a bottle of modified-live vaccine has been opened, it should be used within a few hours. Unused vaccine should be thrown away.

The mixing of different vaccines can render them ineffective. Manufacturers have designed their products to be mixed according to directions. They will not guarantee the product if directions on the label are not followed.

Avoid going back into an opened vaccine bottle with a used needle. This will contaminate the product. Use a filling needle that remains in the bottle. Multi-dose syringes will help to minimize the number of times vaccine is drawn from the bottle.

Most vaccines are administered under the skin (subcutaneously) or in the muscle (intramuscularly). There are also vaccines that are administered in the nose. Newer vaccines on the horizon are being

developed to avoid administration with a needle. This is in response to the Beef Quality Assurance initiatives that have been developed over the last decade. The National Cattlemen's Association recommends that all vaccinations be given in front of the shoulder to avoid vaccination abscesses in the more valuable parts of the carcass. The dairy producer may not recognize this as an issue because most dairy carcasses become ground beef.

It should be pointed out, however, that vaccination blemishes also affect beef tenderness. As a producer of beef, follow recommended production practices to enhance the quality of the product you produce.

Needle size is important. An 18-gauge, 1 1/2-inch needle should be used for intramuscular injections on most cattle. A 1-inch needle can be used on smaller calves. An intramuscular injection should be administered at a right angle to the animal. A 16- to 18-gauge, 1/2- to 3/4-inch needle should be used for subcutaneous injections. The skin should be tented (pulled away from the body) in order to avoid an intramuscular injection.

Needles should be changed frequently (approximately every 10 head) and kept clean during the vaccination process. **Do not clean needles and syringes used for modified-live vaccines with disinfectant. This may inactivate the vaccine.** Remember to dispose of needles properly and safely. Have a container designated for needle and syringe disposal. Clean used syringes thoroughly. Mild soap may be used for syringes that will be used with killed vaccines. It is a good



Subcutaneous vaccination in front of the shoulder is most often recommended.



Intramuscular injections in the rump or thigh may be used if subcutaneous injections do not fit the situation.

idea to dedicate multi-dose syringes for a particular purpose. **A multi-dose syringe can be labeled and used with modified-live vaccines only. It should not be cleaned with soap or disinfectant. Residues in the syringe can inactivate any modified-live vaccines used later on.**

Reasons for Vaccine Failure

Effective vaccination is dependent upon having a healthy animal that is capable of responding to the vaccination. It should be remembered, however, that not all vaccination is 100 percent effective. There are animals that for unknown reasons are not capable of mounting a response to the vaccine. The number one reason for vaccine failure is not following the directions on the label. Manufacturers work hard to ensure that you receive the highest quality and most effective product they can provide. If you follow the guidelines above, there should be minimal problems.

Tables 2 and 3 illustrate diseases to include in a vaccination schedule and specify conditions that dictate such vaccination programs. Remember that

Table 2. Vaccination Schedule: Cows and Bulls¹

Recommended Vaccines	Time to Vaccinate
IBR	Annual
BVD	Annual
PI ₃	Annual
BRSV	Annual
Leptospirosis (5-way)	Annual (every 3 to 6 months in some areas)
Optional Vaccines – Use as Needed	Time to Vaccinate
Vibriosis	Annual (30-60 days before breeding) ²
Trichomoniasis	Annual (30-60 days before breeding) if needed
Pinkeye	As needed
Anthrax	Annual
Blackleg 7-way	Annual
Anaplasmosis	As needed
Foot rot	As needed
Mastitis	As needed, primarily for <i>Staphylococcus aureus</i>
Hairy heel warts	As needed
<i>E. coli</i> for scours	Vaccinate dry cows and/or calves

¹ Some vaccines require two doses; follow manufacturer's recommendation.

² Recommended for bulls.

Table 3. Vaccination Schedule: Calves and Heifers¹

Recommended Vaccines	Time to Vaccinate
Blackleg 7-way	At 2-6 months
IBR-BVD-PI ₃	Intranasal vaccine for IBR and PI ₃ needed at 1-2 weeks; repeat with BVD at 4-6 months and 12-16 months
Leptospirosis	Before breeding and every 6 months
Brucellosis	Heifers (4-12 months)
BRSV	At 4-6 months and 12-16 months
Optional Vaccines – Use as Needed	Time to Vaccinate
<i>Pasteurella</i>	At 4-6 months and 12-16 months
<i>Haemophilus somnus</i>	At 4-6 months and 12-16 months
Vibriosis	Before breeding
Pinkeye	As needed
<i>E. coli</i> for scours	Vaccinate springing heifers (twice 30 days before calving)
Rota and Corona virus for scours	Vaccinate springing heifers (twice 30 days before calving)
Anthrax	As needed
Ringworm	As needed
Warts	As needed
Foot rot	As needed
Diarrhea	As needed

¹ Some vaccines require two doses; follow manufacturer's recommendation.

exposure to disease on each farm varies; therefore, vaccination programs may vary from farm to farm, county to county and between states. Follow the advice of local veterinarians since they are most knowledgeable about diseases in your area. If you administer vaccines yourself, follow directions carefully with regard to site of vaccination and care of the vaccine.

Conclusion

Vaccination programs should always be customized for your operation. Items to consider while establishing a vaccination program include geographic region, type of cattle operation, frequency of introducing new cattle, post vaccination problems and export or interstate shipping requirements.

For best results, always follow the manufacturer's recommendations for dosage, method of administration, number of times given and proper storage. Work with a veterinarian who is familiar with your dairy cattle operation to set up the vaccination program.

References

The Merck Veterinary Manual, 1998. Eighth Edition.
Merck and Company, Inc., Rahway, NJ.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

DR. JODIE A. PENNINGTON is Extension dairy specialist and **DR. JEREMY POWELL** is Extension veterinarian with the University of Arkansas Division of Agriculture, Cooperative Extension Service, in Little Rock.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director, Cooperative Extension Service, University of Arkansas. The Arkansas Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, gender, age, disability, marital or veteran status, or any other legally protected status, and is an Equal Opportunity Employer.

FSA4012-PD-1-06RV