

# Cow-calf vaccination programs: Vaccines and beyond

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## Abstract

The term “herd health” means different things to different people, both producers and veterinarians. Many times producers equate a herd health program with a vaccination program. However, much more goes into preventive herd health programs than just a good vaccination program. To truly immunize cattle, they must have a working immune system at the time of vaccination. That means that we need to minimize all of the stressors that negatively impact the immune system.

Herd health programs can be divided into 6 parts: nutrition; parasite control; biosecurity; vaccinations; genetics; and stress management. A good analogy is a 6-strand barbed wire fence. You need all the strands intact to keep cattle in. The more strands that are broken, the higher the risk of cattle escaping. All 6 parts of a herd health program are important. We can't pick only the ones that are easy or cheap.

It is most cost-effective to personalize each herd health/vaccination program. Many ranches don't need every vaccine available, and in some cases recommendations don't fit the business model of the ranch. “Cookbook” programs are a good place to start, but should be tailored to each ranch.

**Key words:** beef cattle, herd health, vaccination

## Résumé

Le terme ‘santé du troupeau’ signifie différentes choses pour différentes personnes autant pour les producteurs que pour les vétérinaires. Les producteurs vont souvent assimiler un programme de santé du troupeau à un programme de vaccination. Toutefois, un programme de santé du troupeau est bien plus qu'un bon programme de vaccination. Pour que les bovins soient vraiment immunisés, ils doivent avoir un système immunitaire fonctionnel au moment de la vaccination. Ceci implique que nous devons minimiser tous les facteurs de stress qui ont un impact négatif sur le système immunitaire.

Les programmes de santé du troupeau peuvent être divisés en six parties : l'alimentation, le contrôle des parasites, la biosécurité, la vaccination, la génétique et la gestion du stress. Une clôture de barbelés avec six brins est une bonne analogie. Vous avez besoin que tous les brins soient intacts pour garder les bovins à l'intérieur. Plus il y a de brins brisés et plus le risque que les bovins s'échappent augmente. Les six composantes dans un programme de santé sont toutes importantes. Nous ne pouvons pas choisir seulement celles qui sont faciles ou peu coûteuses.

Il est plus rentable de personnaliser les programmes de santé/vaccination à chaque troupeau. Plusieurs élevages ne requièrent pas tous les vaccins disponibles et dans certains cas les recommandations ne correspondent pas au modèle d'affaires de l'élevage. Les programmes clés en main sont un bon départ mais ils devraient être ajustés à chaque élevage.

## Nutrition

The single biggest herd health threat to cow-calf operations is inadequate nutrition. If nutrition is optimized, health and production will be also. If it is not optimized, diseases and production losses will be a problem. Poor nutrition (protein, energy, vitamins, and minerals) depresses immunity to diseases and interferes with response to vaccination.

Nutrition in the brood cow has a major impact on calf health and performance, and ultimately the profitability of the ranch. One year of poor nutrition can have impacts for multiple years. When cows cannot maintain adequate body condition, dystocia problems increase. Thin cows have trouble pushing with enough force to have calves in a timely manner. This leads to more stillborn and weak calves. Weak calves are more likely to die of cold stress and have poor colostrum intake. Cows that cannot maintain their body condition also produce poor quality colostrum, further compounding failure of passive transfer problems. Failure of passive transfer leads to more disease and death in calves. Any calf that gets sick, even if it recovers, will not ever perform to its genetic potential. Calves that have failure of passive transfer but remain healthy still have decreased lifetime performance. Cows that calve thin will either not rebreed or will breed late. And heifers born to thin cows, even when managed with appropriate nutrition, will have decreased reproductive performance when compared to heifers born to cows in good condition. This all adds up to fewer pounds of calf weaned per cow for multiple years, and decreased productivity of feeder calves and heifers beyond weaning.

## Parasite Control

Good parasite control is essential for good health and productivity, especially in young animals. Controlling parasites increases weaning weights, milk production, and conception rates. Parasites are also immunosuppressive, so overall disease resistance and response to vaccines is decreased in parasitized animals.

With the emergence of serious anthelmintic resistance, parasite control programs need to be overhauled. The con-

cept of “routine deworming” needs to be abolished. Parasite control programs need to be tailored to individual operations based on diagnostics and a clear understanding of cattle and grass management on the ranch.

### **Biosecurity**

I do not know who to credit with this quote, but it is a favorite: “Most disease is bought and paid for”. A good biosecurity program will protect a herd from diseases in which there is not a good vaccine available or what’s available is very expensive. It is futile to try to eliminate a disease problem if you are not going to prevent it from coming back into the herd. Biosecurity plans can be challenging and time consuming to develop initially, but they are the cheapest and most effective means of disease control. No disease prevention program will work without biosecurity. There are different levels of risk, and therefore biosecurity needs, with different management/business models. It is up to the veterinarian to discuss the risks of certain management practices and business models, and help producers develop practical biosecurity plans that fit each ranch.

Biosecurity plans do not have to be complicated. Since beef breeding animals are usually housed outdoors, the elements help with disease control. Some simple biosecurity recommendations are a good start: test purchased animals for diseases of concern (BVD, Johne’s, etc.); quarantine new arrivals and any animals that are returning from shows or sales; avoid fence line contact with neighboring herds; and purchase breeding stock and embryo recipients from as few sources as possible.

### **Vaccinations**

As mentioned before, there is no generic/cookbook vaccination program. Many programs are similar, but each should be tailored to the ranch. Management issues such as disease risk, breeding season, disease history, locale, etc. must all be taken into consideration. A “generic” vaccination program would have to cover all known diseases and be safe to recommend for all herds. The result would be a more costly but less effective vaccination program. Timing of vaccinations relative to ranch issues is also as important as selecting the right products.

### **Genetics**

Genetically selecting animals that are more resistant to diseases is a growing field of research, and some important breakthroughs have occurred recently. Recent work by Bonnie Mallard at the Ontario Veterinary College showed that cattle can be tested and categorized into high, medium or low immune responders. High immune responders are less likely to have many disease issues. Dr. Alison Van Eenennaam and others across the United States have done pivotal work trying to better understand the genetics of animal resistance to respiratory disease.

Fetal programming and epigenetics are also areas of ongoing research. Fetal (or developmental) programming is the concept that a maternal stimulus or insult at a critical period in fetal development has long term impacts on offspring. For example, nutritional stress in the 1st and 2nd trimesters of pregnancy can lead to problems with fetal organ development and vascularization/placental development. Epigenetics is the study of heritable changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence. The resulting adverse long-term effects reflect a mismatch between fetal environmental conditions and the conditions that the individual will confront later in life. For example, when calves are born to thin cows, they may later have health and performance issues when placed on full feed in the feedyard. Knowing the implications of our management practices could lead to recommendations on matching cows to their ideal environment and managing feeder and breeding cattle for better performance.

### **Stress Management**

Other stressors such as castration, dehorning, weaning, commingling, handling, heat, cold, etc., depress the immune system, making animals more susceptible to disease. They also interfere with vaccine response. We can’t eliminate all stressors, but we can manage them to minimize the impacts.

### **References**

Available on request.