Summary

This presentation is a summary of Dr Berezowski’s IBC 2000 discussion that covered vaccine use in bison. The advantages and disadvantages of using vaccines in bison are discussed. Every producer must make a decision as to which vaccines are appropriate for his/her operation. This article gives some information to help bison farmers make an informed decision.

Vaccines prevent specific diseases in animals by stimulating the animal’s immune system to produce the necessary antibodies and cell responses that are required to inactivate an invading bacteria or virus. Once these responses have been induced they are remembered by the animal's immune system and are available to inactivate the bacteria or virus when there are any future invasions. Vaccines are very specific in the protection that they provide to an animal. A vaccine designed to protect against blackleg will protect an animal against blackleg and no other disease. When designing a vaccination program for bison there are several points that must be considered before any vaccines are selected:

**Do bison get the disease that the vaccine is designed to protect against?**

Bison are more susceptible than cattle to some cattle diseases and are less susceptible than cattle to others. There is no point in vaccinating bison to protect against a bacteria or virus that doesn't produce disease in bison. Some of the most common vaccines that are available for cattle are:

- **IBR Infectious bovine rhinotracheitis**
  Infections have been reported in bison but disease has not been reported

- **PI-3 Parainfluenza three**
  Infections have been reported in bison, but have not been associated with disease

- **BRSV Bovine respiratory syncital virus**
  Has not been reported to cause disease in bison

- **BVD Bovine virus diarrhea**
  Has been reported to cause disease in bison
Hemophilosis
Has been reported to cause disease in bison.

E. coli scours
Has not been reported to cause diarrhea in bison calves

Rota and Carona virus scours
Rota virus has been reported to be associated with diarrhea in bison calves

Brucella abortus
Has been reported to cause disease in bison, but vaccination is controlled by federal or state government agencies.

Footrot
Occurs occasionally in bison, but the causative agent is unknown

Pinkeye
Occurs in bison, but the causative agent is unknown

Leptospirosis
Has been reported to cause disease in bison

Clostridium species
Blackleg/malignant edema
Redwater
Necrotic enteritis
Some of the clostridial organisms have been reported to cause disease in bison

Pasturella hemolyticum
Has been reported to cause disease in bison.
The problem with deciding whether bison are susceptible to many common cattle diseases is that there has been very little research done into effects of any of these diseases on bison. The lack of good information about diseases of bison forces bison producers to make guesses about those diseases that bison are susceptible to.

Are the bison on your farm at risk of developing the disease that the vaccine protects against?

Some diseases are known to occur only in very specific geographical locations, where as others, such as blackleg, can occur anywhere. Some diseases are associated with certain methods of production. An example is hemophilosis which is found to occur most frequently when recently weaned bison calves are maintained in large groups in feedlot like settings, but rarely occurs in cow calf bison operations that wean small groups of
calves. Some diseases are associated with certain environmental conditions. Calf scours in newborn bison calves most often occurs when bison cows are tightly confined in wet environments during calving. The best way to find out which diseases your bison herd may be at risk of getting is to consult your local veterinarian. He/she will know which diseases occur in your area and will be able to combine this information with an assessment of the way that you manage your bison to come up with a list of diseases that your bison herd may be at risk of contracting. This list may not be the same as a list drawn up for your neighbor 5 miles down the road. The reason for these differences is that you and your neighbor may not be using the same management practices. This is also the reason why one bison producer may have a problem with a disease such as pneumonia in his weaned calves every year, and his neighbor across the road may have never had a problem with the disease.

**Is the vaccine safe for use in bison?**

Some vaccines can cause adverse reactions when they are used in a species for which they were not intended. When a pharmaceutical company is granted a license to produce and sell a vaccine, the license specifies which species the vaccine may be legally administered. As part of the licensing process, the pharmaceutical company must ensure that the vaccine is safe when administered to those species for which it has been granted a license. The pharmaceutical company does this by conducting safety trials for the vaccine. These trails are conducted only in the species for which the company has been granted a license. Even though this process provides us with some assurance that the vaccine is safe when administered to the intended species, there have been many instances in which vaccines have caused adverse reactions, including deaths, in their intended species. In these cases the pharmaceutical company is obligated to provide compensation to the farmer for any losses that have occurred. Pharmaceutical companies, however, make no claims about the safety of a vaccine when it is administered to any species for which the vaccine was not licensed. If adverse reactions occur in these species the farmer has no legal recourse and must absorb the cost for any losses. All of the vaccines that are currently being used in bison have been developed for use in cattle. There have been no safety trials conducted on any of these vaccines in bison. The pharmaceutical companies make no claims about, and are not responsible for the safety of any bison to which these vaccines are administered. Any bison producer who uses a cattle vaccine in their bison herd must be aware that they are assuming the risk for any losses that may occur from adverse vaccine reactions. It is true that many bison producers have been using cattle vaccines on their bison for years with no adverse reactions. Although this past experience may make us think that cattle vaccines are safe for use in bison, it does not necessarily mean that all cattle vaccines are safe to use.
in bison under all conditions. Modified live virus BVD vaccines have caused outbreaks of diarrhea when they have been administered to recently weaned bison calves. Certain respiratory vaccines are not designed for use in beef calves that are very young or are under certain body weights. These vaccines may precipitate outbreaks of pneumonia in beef and bison calves when used on very young or small calves. Some modified live virus respiratory vaccines are not recommended use in pregnant beef cows and certainly should not be used in pregnant bison cows. For these reasons it is important to consult someone who has some knowledge of cattle vaccines before using these vaccines in your bison.

**Does the vaccine you wish to use produce a protective immune response in bison?**

In other words does the vaccine induce the production of antibodies or cellular responses in bison that are capable of inactivating an invading bacteria or virus. In order for a pharmaceutical company to license a vaccine for use in cattle they must demonstrate, through experimental trials, that the vaccine induces an immune response in vaccinated cattle. Then they establish the dose required to produce the immune response and determine the length of time that cattle can remember the response. This allows them to establish the frequency with which the vaccine must be readministered in order to maintain adequate protection in vaccinated cattle.

In general bison producers use cattle vaccines on their bison with the same dose and re-administration recommendations that are used for cattle. However, there have been no experimental trials conducted on any of these vaccines in bison. Therefore it is not known whether any cattle vaccines can produce an immune response in bison. The dose and frequency of re-administering these vaccines to bison is also not known. Because we have no information about these vaccines in bison it is important to use them with caution. Only vaccinate your bison against those diseases that pose a definite risk to your herd. Vaccinating your bison against diseases for which they are not at risk is at best a waste of money, and it predisposes your bison to any adverse reactions, that may be associated with the vaccine.

**Does the vaccine you wish to use actually protect bison against the disease?**

Vaccines that produce immune responses in animals against specific bacteria or viruses do not necessarily protect the vaccinated animals against disease caused by these agents. There are cattle vaccines on the market today that stimulate vaccinated cattle to produce an immune
response against a specific bacteria or virus, but do not protect the vaccinated cattle against the occurrence of disease caused by the virus or bacteria. The ability of a vaccine to prevent disease is usually determined in clinical trials. Clinical trials are experiments in which vaccinated and non-vaccinated cattle are exposed to a disease causing agent. The rate of occurrence of disease in the two groups is compared to determine the effectiveness of the vaccine. If a vaccine is very effective there will be no disease in the vaccinated group, and a high level of disease in the non-vaccinated group. There have been many clinical trials conducted for cattle vaccines used in cattle, but there have been no clinical trials performed for these vaccines when they are administered to bison. The lack of clinical trials means that we have no real idea about the effectiveness of any cattle vaccines when they are administered to bison. Using ineffective cattle vaccines on bison is a waste of money, and can place bison at risk of adverse reactions. It is important that bison producers use these vaccines with caution and choose only to use vaccines that have the potential to protect bison against diseases that pose a definite risk to their herd.

**Summary**

In North America there are a tremendous number of vaccines that are available for use in cattle. Each of these vaccines has its own characteristics, which include: type of vaccine, efficacy, safety, dose, re-administration times, cautions, restrictions, withdrawals, etc. This plethora of vaccines makes it extremely difficult for cattle producers to design vaccination programs for their cattle. If you consider that much of the information available for these vaccines may be of questionable value when applied to bison, it is easy to see that designing a vaccination program for a bison herd is even more difficult.

At this point in time bison carry a considerably higher economic value than cattle. Along with the high economic value of live bison comes the high economic loss associated with dead bison. This potential economic loss can motivate some bison producers to try to protect their bison against every disease for which a vaccine exists. Because of our lack of good information about the effects these vaccines can have on bison, this strategy may result in an increased risk of losses due to adverse vaccine reactions rather than a reduction in the risk of contracting disease. More is not better.

Since it is you, the bison producer who must bear the financial cost associated with any losses, it is to your advantage to make intelligent, informed decisions about the vaccines that you select for your bison herd. The first step in developing a well thought out vaccination program is to identify those diseases which pose a risk to your herd. These diseases should include only those that are found in your geographic location, and
those that are known to be associated with management practices similar to yours. The second step is to select and use only those vaccines which have the potential to protect your bison from these diseases. Throughout this process it is very important that you seek out as much information as you can about the risks facing your herd and the potential effects different vaccines may have on your bison.