



Vaccination Guidelines

'How to get the maximum benefit when vaccinating your beef cattle herd'

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VIDO Beef Technical Group – *Linking knowledge to practical solutions*
Vaccination Guidelines – Revised June 2005
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I VIDO Beef Technical Group

The goal of the VIDO Beef Technical Group is to investigate and discuss disease/production challenges affecting cow/calf and feedlot operations. Our goal is to provide an open forum for discussion on topics chosen by the group and then publish these discussions on the VIDO website.

Vaccination Guidelines - ‘How to get the maximum benefit when vaccinating your beef cattle herd’ is a starting point for deciding which diseases to vaccinate your herd against, and the proper handling, storage and use of the vaccines you have chosen. Future projects will discuss vaccination strategies.

THE VIDO Beef Technical Group, formed in June 2001, brings together from across Canada a broad spectrum of individuals with expertise in the beef industry, from producers to research scientists.

Technology transfer “back through the farm gate” becomes ever more important as production expands and the demand for quality and accountability increases. The VIDO Beef Tech Group is helping producers stay up to date on industry trends that affect profitability, animal health, food safety, the environment and public awareness.

Solutions to many of the issues facing producers face need the authentication that good science can provide. Feedback tells us producers respect information made available through a group whose credentials are undoubted.

Mandate

1. Provide relevant and current information to benefit beef producers.
2. Bring the animal health concerns of cattle producers to VIDO for consideration.

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Vaccination Guidelines

'How to get the maximum benefit when vaccinating your beef cattle herd'

II CONSIDERATIONS FOR VACCINATION

One of the management tools a producer can use to reduce and prevent disease is vaccination. Vaccines can be a valuable tool, but much of their effectiveness depends upon proper usage. Producers will be able to use vaccines more effectively if they understand their limitations and incorporate other management procedures to prevent or reduce disease.

Vaccine usage needs to be planned relative to the predicted time of disease challenge, and vaccine limitations including the time following vaccination when a protective immune response is present, taken into account. For best responses of vaccines, producers should follow the manufacturer's directions on the label for vaccine delivery to cattle (e.g. prebreeding, preweaning).

Effectiveness of vaccination depends upon:

Risk factors

- a) Age
- b) Sex
- c) Previous exposure or vaccination
- d) Management
- e) Time/Season

Efficacy

- f) Age
- g) Timing
- h) Health
- i) Disease of interest
- j) Vaccine type and quality
- k) Individual animal response

Duration of immunity



III Proper Storage and Handling of Vaccines

Transport, store and handle vaccines according to the manufacturer's recommendations.

It is important not to break the 'cold chain', a phrase used to describe the manner in which a vaccine should be transported and stored— at an optimum temperature that avoids temperature extremes. From the time of purchase to the time of use, vaccines should be kept at the recommended storage temperature (see label on bottle), also avoiding exposure to ultra-violet light. For example, use a Styrofoam box with a tight-fitting lid. Transport the vaccine securely in this box on cold packs. Your veterinarian should provide a box with an ice pack until you get home, at which time the vaccines should be immediately stored in the refrigerator until they are ready for use. Care should be taken to ensure that the vaccine does not freeze, because this can render many vaccines ineffective.

If a group of animals is to be processed, or if several vaccines are to be delivered, keep vaccines in a cool, insulated container and remove them only as needed. Once opened, a bottle of modified live vaccine should be used within an hour and a bottle of killed vaccine should be used within 6 to 8 hours.

Killed vaccines need to be used the same day that the vaccine bottle is opened. Follow the label and the manufacturer's recommendations. It is also important to gently remix (invert bottle several times – do not shake harshly) the killed vaccines during the day since some vaccines settle if you buy in large volume bottles (example: clostridial bacterins).

Most modified live vaccines must be re-hydrated by adding a sterile diluent to a vacuum-packed, freeze-dried material. This can be mixed in one of two ways:

- The vacuum in the vaccine bottle will easily draw the fluid from the diluent bottle through a transfer needle (sharp on both ends). To avoid sucking air, put one end of the needle into the diluent bottle first, hold the diluent bottle upside down and put the other end of the needle into the freeze-dried bottle.
- If you are using a syringe and needle to transfer diluent, use a clean syringe to avoid contamination of the entire vial with residual material in the syringe.

After re-hydration, modified live vaccines are only effective for an hour under perfect conditions. Exposure to sunlight and heat will kill the virus very quickly and render the vaccine ineffective. Alcohol or any disinfectant applied to the needle between animals can kill a modified live vaccine. For this reason, when you use a modified live vaccine, refrain from disinfecting the needle between animals. Change needles every time you refill the syringe if using a 50 cc automatic syringe; otherwise every 10 to 15 head, or when the needle is dull, bent, burred or dirty. Use syringes that have **not** been previously cleaned with



disinfectant (example: Hibitane or Betadine or soap). Mark your automatic syringes so that syringes used for killed vaccines are not subsequently used for MLV.

You should also use a clean needle for withdrawing vaccine from the vial, as a used needle can contaminate the vaccine.

Proper handling and storage of vaccines will ensure that the vaccine retains optimal efficacy.

IV Combining Vaccines

Always read the label directions on the vaccine and follow them. Never mix different vaccines.

V Preparation

i) Read the label

Familiarize yourself with the product

Vaccination protocol:

- a. Dosage
- b. Route of administration (*discussed further in the document*)
- c. Injection location (*discussed further in the document*)
- d. Indications for use (disease protection)
- e. Warnings and cautions
- f. Storage conditions
- g. Expiry Date
- h. Withdrawal time

ii) Syringes

Cleanliness, correct dose (syringe working properly)

iii) Manpower

Technique briefing and demonstration

iv) Animal Handling Equipment

Equipment function – ensure chutes and facilities are in good working condition

Eliminate hazards

Proper restraint – Securely restrain cattle so the neck injections can be given

Personnel safety

Animal safety

v) Vaccine Preparation



During preparation avoid exposure to sunlight and keep vaccine as cool as possible.

Prepare each bottle of vaccine as needed. Do not premix all MLV vaccines prior to starting processing. Do not prepare more MLV vaccine than what can be used within 1 hour. Transfer needles are preferred over syringes.

Killed vaccine should be used up within the same day.

VI Injection Techniques

Ensure that the animal is restrained securely before injection. Use only sharp and straight needles (discard dull, bent or burred needles).

i) Use the correct needle, spacing and order of vaccination

Use needles of appropriate size, based on the age of the animal, weight of the animal, the route of product administration, and the viscosity of the product.

- IM (intramuscular) – 18 or 16 g, 1 to 1 ½”
- SC (subcutaneous) – 18 or 16 g, ½ to 1”
- No vaccines go IV



Give all vaccines in the neck

NEVER inject in the hip or thigh, regardless of the age of the animal. The top hip is the top butt or sirloin steak and the thigh is the round muscle cuts.

(<http://www.cattle.ca/QSH/pharmaceuticals/CMIB.htm>)



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Injections into these prime cuts of beef will cause a tissue reaction that leads to scarring, making the area up to 3 inches away from the injection site tough and not suitable for human consumption. This tissue scarring persists for the life of the animal; thus, even injections in the hip or thigh of baby calves will create tough beef and injection scars at slaughter 18 months later. Rib and hip cuts from cows and bulls do make it into white table meats. Therefore, these injection site techniques hold true for cows and bulls as well – inject only in the neck. If a product label indicates that you can give the vaccine either IM or SC, then give the product SC.

Space multiple injections in the neck greater than 3 finger-widths apart so vaccines don't mix or create a pocket of blood, and to minimize potential interference between vaccines. It may be advisable to deliver killed and modified live vaccines on opposite sides of the neck.

Repeat visual inspections to ensure needles are intact. This will reduce the risk of broken needles in beef, a food safety hazard.

ii) Select the best route of administration

Follow label instructions for route of administration.

- Give SC injections using the 'tent' method.
- Give IM injections in the neck, perpendicular to the skin.

iii) Dealing with broken and bent needles

When a needle breaks during injection:

- Feel the injection site, you MIGHT find the needle for removal.
- If the needle cannot be removed, identify the suspect animal, record animal's tag number on processing or treatment records and inform the next buyer on shipment of animal that it may have a broken needle in its neck (identify the location).

Identify processed and treated animals on your records. Keep processing and treatment records.

VII Post-Vaccination Procedures

i) Adverse Reactions

Animals should be observed after vaccination for evidence of adverse reactions. Life-threatening anaphylactic responses can occur. Cattle should be observed for at least one hour post-vaccination. Itching, swelling and redness of the skin may indicate signs of a local adverse response. Adverse responses may not be limited to the injection area and may be visible around the nose, anus and vulva.



Severe systemic reactions are those of anaphylactic shock and may include rapid breathing, trembling, salivation, high fever, anxiety, bloat, diarrhea and sudden collapse. Treatment with Epinephrine is indicated.

Observe remaining animals previously treated that are not immediately affected. Consult with your veterinarian for further instructions.

iii) Reporting Adverse Reactions

All adverse reactions should be reported to your veterinarian. Ask your veterinarian to forward information on adverse reactions to the Veterinary Biologics section of the Canadian Food Inspection Agency (CFIA) The following information is required to report suspected adverse reactions:

- + Trade and assigned name of product
- + Manufacturer
- + Serial or lot number
- + Expiration date
 - (The bottles and boxes of used vaccine will provide this information.)
- + Owner's name and address
- + Name, address and telephone number of vaccine supplier
- + History and symptoms

VIII Waste Disposal

i) Disposal of Sharps

Sharps include needles and scalpel blades. There is a risk of needle-stick injuries or cuts when these sharps are not handled or disposed of properly.

Drugs, vaccines or blood may cause reactions or infections if they are present on broken glass or used needles.

To safely dispose of sharps, use a rigid plastic or metal puncture-proof container with a sealed lid. These special containers can be obtained from local veterinary clinics. Label clearly as '*Sharps Container*' and '*Not for Recycling*'. A plastic jug with a narrow mouth or a 20-litre pail with a narrow opening in the lid also works well. **Do not burn sharps containers.** Full containers of waste needles can also be taken to the local veterinary clinic or hospital for disposal. Contact them first to ensure they accept these materials.

ii) Disposal of Vaccines and Vaccine Containers

Regularly check all vaccines for the expiry date. All vaccines past the expiry date should be discarded according to provincial environmental regulations.



On some vaccines, the label states 'use entire contents when first opened'. The remaining vaccine should be discarded after vaccination is complete – consult a veterinarian. There are two classes of expired vaccines – unused (unopened) and used (opened). Unused expired vaccine can be returned to the point-of-purchase, such as the veterinary clinic. Many manufacturers will accept them for disposal.

Modified-live virus vaccines should be rendered noninfectious before disposal to prevent the virus from potentially infecting workers or animals. This can be done by freezing, autoclaving, burning or adding bleach to the bottle. Discard bottles with their contents.

Sanitation of Vaccine Syringes

If multiple dose syringes are reused, the following syringe cleaning and care points will help you avoid injection site infections:

- ✚ Clean the external syringe surface with soap, water and a brush.
- ✚ Rinse the inside components of the vaccine syringe, including tubes and connectors with distilled or de-ionized water that is near the boiling point (greater than 180° F). This is accomplished by repeatedly drawing water that is greater than 180° F into the syringe and squirting it out. Three to five rinses should be adequate. Remove as much water from inside the syringe as can be squirted out and let the syringe cool before using. Heat kills modified live vaccine products. **You should not use a soap or disinfectant on internal components. Soap or disinfectant residues may kill MLV vaccines.**
- ✚ Store the vaccine syringe in a dust-free, dry (low humidity) environment. It is best if the newly cleaned vaccine syringe is stored in a new zip-lock bag and placed in the freezer.
- ✚ Vaccine transfer needles should be boiled in water and allowed to cool before using. Transfer needles should be stored in a new zip-lock bag in the freezer.



iii) Human Risk

Accidental injection of vaccines for livestock in humans can potentially cause serious health problems. If an accident occurs, consult the provincial poison control centre and be prepared to describe the vaccine and the location of the injection accident, and how much vaccine was injected.

Take the bottle of vaccine along with you if you are instructed to go to the hospital to receive medical attention.

The following is a list of Main Poison Control Centres in Canada:

British Columbia -	1-800-567-8911
Alberta -	1-800-332-1414
Saskatchewan -	1-866-454-1212
Manitoba -	1-204-787-2591
Ontario -	1-800-267-1373
Quebec -	1-800-463-5060
New Brunswick -	1-800-244-8353
Newfoundland -	1-709-722-1110
Nova Scotia -	1-902-428-8161
PEI -	1-800-565-8161



Appendix A

How Vaccines Are Licensed

The Veterinary Biologics Section of the Canadian Food Inspection Agency (CFIA) is responsible for the licensing of veterinary vaccines in Canada. Biologics are licensed to ensure they are safe and efficient in animals and pose no threat to humans or the environment. Biologic regulations are part of the Health of Animals Act.

Manufacturers and importers are required to notify the Veterinary Biologics Section (VBS) of suspected adverse reactions.

Individual animal owners or veterinarians are encouraged to report suspected adverse reactions to the Veterinary Biologics Section of the CFIA.

Label Claims: All vaccines are registered with one or more of the following labeling claims:

- a) Prevention of infection – prevents all colonization or replication of the organism in vaccinated animals.
- b) Prevention of disease – at least 80% effective in preventing clinical disease.
- c) Aid in the prevention of disease – prevents disease by a clinically significant amount. The majority of bovine vaccines registered in Canada and the United States are in this category.
- d) Aid in disease control – alleviates disease severity, reduces disease duration or delays disease onset.
- e) Other claims – effects other than direct disease control, such as the control of infectiousness through the reduction of pathogen shedding, if there is a clinically significant effect.

General Criteria for Product Acceptability

- a) The product must be pure, safe, potent and efficacious. Purity and safety (consistency of product) are regarded as being the most important.
- b) The product must be licensed or approved in the country where it originates.
- c) Each biologically active component must be relevant to Canadian disease conditions.
- d) The product must be produced and tested in accordance with generally accepted 'good manufacturing practices' and 'current state-of-the-art'.

Use vaccines for which there is published evidence that the vaccine is efficacious.



Appendix B

Special care points for metal syringes:

Metal syringes can be taken apart and boiled in hot water.

- a. Clean work area ... don't try to work in an area subject to blowing dust
- b. Wash external surface of syringes
- c. Operator needs to wash his or her hands for 2 minutes
- d. Cover clean work area with new, clean paper towels
- e. Disassemble syringes
- f. Wash syringe parts with clean, hot tap water (do not wash the internal parts with soap or disinfectant)
- g. Boil all internal syringe parts in boiling de-ionized or distilled water for five minutes
- h. Reassemble while hot
- i. Use a small amount of CLEAN vegetable oil spray to lubricate rubbers,
- j. After assembly is completed, rinse the internal parts three to five times with water hotter than 180° F
- k. Allow the syringe to cool for 10 minutes before using
- l. If storing the syringe, place the syringe in a new zip-lock bag
- m. Store the syringe in a freezer
- n. Prior to using the syringe after storage, rinse the internal syringe with water hotter than 180° F. Boil 2 cups of water in microwave and pull boiled water into syringe three to five times
- o. Let syringe cool for five to ten minutes before using

Special care points for plastic automatic syringes:

Plastic syringes can be heat-sterilized in a microwave oven. Note that this is another method of heat sterilization; there is nothing special about microwaves in this instance. The plastic automatic syringe must be covered in water while being heated in a microwave oven.

- a. Wash the external parts of the plastic automatic syringe in soap and water
- b. Rinse the internal parts with hot tap water (do not use soap or disinfectant) by drawing water up through the intake tube while repeatedly depressing the syringe plunger
- c. Completely fill the plastic automatic syringe with de-ionized or distilled water (draw-off tube and syringe should be full of water)
- d. Wrap the plastic automatic syringe in five to ten layers of wet paper towels
- e. Place the wet-paper-towel-wrapped syringe in a zip-lock bag
- f. Leave zip-lock bag open and place in a microwave oven
- g. Set microwave oven on high setting and microwave each plastic automatic syringe individually for five minutes
- h. Check moistness of paper towel wrapping half way through the process and remoisten if paper towels appear to be drying out



- a. If paper towels become too dry while in the microwave they can burn
- i. Remove the plastic automatic syringe from the zip-lock bag and unwrap. Most of the water that was filling the plastic automatic syringe will have boiled off; if not, squirt out all remaining water.
- j. Allow syringe to cool for ten minutes before using
- k. If storing, remove zip-lock bag containing the plastic automatic syringe from the microwave oven and place directly in the freezer

Microwave oven sterilization of vaccine transfer needles:

Vaccine transfer needles can be heat-sterilized in a microwave oven. The transfer needle must be covered in water while being heated in the microwave oven.

Two methods are available:

1. Clean the transfer needle in hot tap water (**no soap or disinfectant**) and place the cleaned transfer needle in clean cup. Completely cover with six to eight ounces of de-ionized or distilled water. Microwave using the high setting to bring the water to a boil and continue to boil for one additional minute. Never allow the water level to evaporate to the level of the transfer needle. It must remain completely covered during the process. **OR**
2. Clean the transfer needle in hot tap water (no soap or disinfectant) and wrap in several layers of paper towels. Soak the towels and transfer needle in water and place in a zip-lock bag. Place the zip-lock bag in a microwave oven and leave the top of the bag open. Microwave using the high setting for two minutes. Do not let the paper towels dry out while being heated in the microwave oven.

Quality Control:

If you think you are having a problem with syringe sterility ask your veterinarian to review your vaccine syringe preparation technique, **Note:** heat without pressure will not kill spores, therefore autoclaving or the use of a pressurized canner is required to achieve sterilization at a level adequate to kill spores.

Reference: Excerpt from Dr. Dee Griffin, Great Plains Veterinary Educational Center, NE



Appendix C

PRODUCER DEFINITIONS

A. VACCINE TARGET

Microorganism *An organism that is not visible to the naked eye.*

Pathogen *A microorganism that causes disease. This can include viruses, bacteria, fungi and multicellular parasites.*

Examples of bacteria

Campylobacter
Clostridia
E. coli (Escherichia coli)
E. coli O157:H7
Fusiformis necrophorus
Haemophilus somnus
Manheimia (Pasteurella) haemolytica
Moraxella bovis
Mycobacteria paratuberculosis
Mycoplasma bovis
Pasteurella multocida

Diseases

Vibriosis (abortion), foodborne disease in humans
Blackleg, sudden death, kidney disease
Calf scours
Foodborne disease in humans
Foot rot
Hemophilosis: pneumonia, ITEM, arthritis, myocarditis
Pneumonia, BRD (bovine respiratory disease)
Pink Eye
Johne's Disease (diarrhea)
Polyarthritis, pneumonia
Pneumonia, BRD (bovine respiratory disease)

Examples of viruses

Bovine Herpes Virus-1 (BHV-1) or
Infectious Bovine Rhinotracheitis (IBR)
Bovine Respiratory Syncytial Virus (BRSV)
Bovine Viral Diarrhea (BVD)
Coronavirus
Papovaviridae
Parainfluenza-3 (PI3)
Rotavirus

Diseases

Red nose, abortion, precursor to pneumonia
Pneumonia
Abortion, infertility, pneumonia, congenital deformities
Calf scours, pneumonia
Warts
Pneumonia
Calf scours

Examples of Protozoa

Coccidiosis
Cryptosporidium
Giardia
Neospora

Diseases

Diarrhea (bloody)
Calf scours
Ill-thrift, diarrhea
Abortion

Examples of Prions

Not technically a microorganism
but a structurally modified protein

Diseases

Transmissible Spongiform
Encephalopathy (TSE's)
⚠ Chronic Wasting Disease (CWD)
⚠ Bovine Spongiform Encephalopathy (BSE)

Examples of Fungi

Trichophyton species

Diseases

Ringworm



B. TYPES OF VACCINES

Vaccine *A suspension of microorganisms or parts of microorganisms administered to an animal for the prevention of infectious disease.*

Autogenous vaccine

A vaccine prepared with a pathogen isolated directly from an individual animal or herd for use in the same animal or herd.

Bacterin

A suspension of killed bacteria. For example: 2-way; 7-way; 8-way vaccines that contain several types of Clostridial bacteria.

Killed vaccine

A vaccine where the killed pathogen (bacteria/virus/protozoa, etc.) is used in the vaccine.

Modified live vaccine

A vaccine that contains a live pathogen that has been altered so it no longer causes clinical disease, although it may cause mild clinical symptoms (e.g. IBR vaccine)

Monovalent vaccine

A vaccine against a single pathogen

Multivalent vaccine

A vaccine against several pathogens

Recombinant vaccine

A pathogen or a protein that has been genetically manipulated (i.e. genes have been inserted or deleted to improve the safety or the effectiveness of a vaccine)

Subunit vaccine

A single protein or part of a protein from a pathogen that is incorporated in a vaccine

Toxoid

A toxin that has been structurally altered to destroy its harmful properties without destroying its ability to induce formation of antibodies upon injection (i.e. tetanus toxoid)

Vectored vaccine

A microorganism that does not cause disease and is modified to contain genetic material from a pathogen - when the vectored vaccine is administered, the animal reacts by mounting a specific immune response against the pathogen.



C. VACCINE COMPONENTS

- Adjuvant** *A vaccine component that improves the immune response to the antigen*
- Antigen** *The active component of a vaccine which is recognized as foreign by the animal and induces an acquired immune response. Antigens may include substances such as bacteria, viruses, toxins or foreign proteins.*
- Diluent** *With respect to vaccines, the fluid that one uses to suspend a freeze-dried (powdered) vaccine*

D. RESPONSES TO VACCINES

- Antibodies** *A class of proteins called immunoglobulins produced by specialized lymphatic cells - plasma cells (from B cells). These immunoglobulins bind to a specific antigen of the infecting agent or vaccine.*

Immunoglobulins (Igs) are classified according to their mode of action and are labeled:

- IgG - The most abundant; protects against bacteria, viruses and toxins in the blood*
- IgM - The first circulating antibody to appear*
- IgA - Found in many body secretions such as nasal secretions, saliva and milk (helps calves).*
- IgE - Causes certain cells to release histamines (as happens with allergies).*

- Immunity** *The state of being protected against the effects of a pathogen (i.e. a microorganism or its toxins)*
- Immune System** *Those tissues, cells and body secretions that function to protect the animal from infection by foreign organisms and other harmful substances.*

Types of Immunity:

Acquired immunity

Immunity resulting from prior exposure to a pathogen or vaccine. This immunity is characterized by memory, specificity for a single pathogen or foreign protein and an accelerated secondary response. Acquired immunity is also called active immunity or adaptive immunity and can be divided into 2 responses:



Cellular Immunity (Cell Mediated)

Immune responses mediated by cells that can destroy pathogens. An example would be white blood cells that destroy **virus-infected** cells.

Humoral immunity

Immune response characterized by the formation of antibodies, which are proteins secreted by specific cells (B cells and plasma cells). The antibodies decrease the growth and/or harmful effects of a microorganism or its products.

Maternal immunity

Immunity of the newborn acquired from the mother's blood supply before birth or through colostrum and milk after birth. This is also passive immunity.

Natural (Innate) Immunity

Disease resistance that exists without prior exposure to a pathogen

Passive immunity

Immune protection acquired from another animal. (Example: Colostral antibodies from dam or injection of immune serum)

Immune Response	<i>The response of the immune system following exposure to a pathogen, vaccine or foreign protein</i>
Onset of Immunity	<i>The length of time from vaccination until a protective immune response is present</i>
Duration of Immunity	<i>The period of time during which a protective immune response is present after vaccination. This can determine the frequency of revaccination or the time of vaccination relative to disease risk.</i>
Anamnestic Response	<i>An immune response to an antigen or pathogen to which the animal was previously exposed. This immune response occurs more quickly and is often stronger than the response induced by the first injection or vaccination, also called the secondary response.</i>
Anaphylactic Shock	<i>An adverse response to a foreign protein (e.g. a vaccine) to which the animal has previously been exposed. For example, this is occasionally seen with administration of a blackleg vaccine. In cattle, signs of anaphylactic shock include swelling of the nose, rectum or vulva, rapid breathing and difficulty breathing (appear to be choking) trembling, and may fall down in the chute, anxiety, salivation, and possible sudden death. Treatment with the drug <u>Epinephrine</u> can counteract the above effects.</i>
Serological Response	<i>A measure of antigen-specific antibody present in blood. This response may also be called an antibody <u>Titer</u> and expressed in quantitative units.</i>



Tissue Reaction *Heat, pain, swelling or even an abscess at the site of an injection or vaccination. This is also referred to as a local vaccine reaction.*

Withdrawal Time *The length of time following the administration of a vaccine that an animal must not be sold for human food consumption.*

E. VACCINE DELIVERY

Vaccination *The administration of a vaccine to an animal. This term is often used interchangeably with immunization and inoculation (the administration of a microorganism to an animal).*

Routes of Vaccination:

IM: Intramuscular (into the muscle)
SC: Subcutaneous (under the skin)
IN: Intranasal (into the nostrils)
ID: Intradermal (within the skin)
Oral: Into the mouth
Mucosal: The administration of a vaccine to a mucosal surface such as the digestive tract, the respiratory tract, the reproductive tract or the inner surface of the eyelid.

Primary vaccination *The first time an animal is vaccinated for a particular antigen.*

Revaccination *The second or subsequent vaccination. This is often referred to as a "BOOSTER SHOT."*

Vaccine dose *The amount of vaccine injected is usually measured in milliliters (ml) or cubic centimeters (cc) which are equivalent terms. Syringes used for vaccination are usually calibrated in these units.*

F. VACCINATION PROTOCOL

Label Directions *Manufacturer's instructions on appropriate use of vaccine. This involves disease protection, vaccination schedules, dosage, route of delivery, species for use, warnings, cautions, and withdrawal times.*

Off Label Usage *Product applications not specified by the manufacturer. When used in this manner the manufacturer assumes no liability for efficacy, withdrawal times and safety. A veterinary prescription under a valid vet-client-patient relationship is required prior to off-label use of a drug.*

Lot Number *This is a number, assigned by the manufacturer, which uniquely identifies when and where a product was made. All bottles of a vaccine that were produced at the same time will be assigned an identical lot number.*

Expiration Date *The date, printed on the bottle of vaccine, for which the manufacturer*



(Shelf Life) *guarantees the product, is stable if handled and stored properly. The effectiveness or quality of the product is not guaranteed after this date.*

G. OTHER TERMS

Purity *Vaccine contains specified material only and is free of other micro-organisms.*

Safety *This indicates that the commercial vaccine has been tested to determine if there are either systemic or local reactions following vaccination.*





Efficacy *Demonstration that the vaccine induces a defined biological outcome (e.g. - reduced clinical disease, reduced shedding of a pathogen, reduced transmission of a disease agent) that is relevant to the label claim on the vaccine.*

Potency *Potency is linked to efficacy and for vaccines is a measure of the amount of vaccine antigen required to induce a defined immune response.*

H. VETERINARY CLIENT/PATIENT RELATIONSHIP

A legal definition of the relationship between a veterinarian and a client. The Canadian Veterinary Medical Association has defined this as follows:

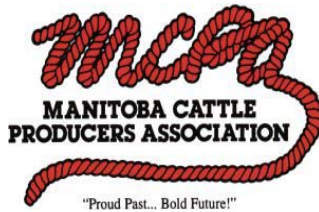
A Veterinarian Client/Patient Relationship (VCPR) exists when all of the following conditions have been met:

-  **The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal(s) and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions.**
-  **The veterinarian has sufficient knowledge of the animal(s) to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of an examination of the animal(s) or by medically appropriate and timely visits to the premises where the animal(s) are kept.**
-  **The veterinarian is readily available for follow-up evaluation, or has arranged for emergency coverage, in the event of adverse reactions or failure of the treatment regimen.**
-  **A valid Veterinary Client/Patient Relationship is needed for dispensing prescription labeled products and off-label use of drugs.**



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