Cattle Vaccination Programs & Immune System Functions

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Importance of Private Practitioner

• Your private practitioner is the best qualified to advise on your vaccination program
  – Understands predominant diseases in a particular area
  – Has ability to develop vaccination program tailored to the needs of each operation

• Carefully consider the diseases that are necessary to prevent in your herd & work with vet to choose the best products for use

• Don’t “over-vaccinate”
Active Immunity

• Is the immunity made in the animal’s own body

• Involves 2 pathways:
  – Cell mediated immunity
    • Production of specific immune cells that kill or remove infected cells or antigens (bacteria, viruses) from site of infection
  – Humoral immunity (antibody production)
    • Production of specific antibodies that appear in the blood
Anamnestic Response (Memory)

- Critical 3rd component of active immunity
- Antigen: components of pathogen that are unique to a specific pathogen
  - What the memory cells recognize if pathogens occur in the animal again
- Antigen recognition is the interaction of invading foreign antigen with specific white blood cells and stimulation of immune system to produce response
- Memory enables humoral and cell mediated immune system to remember previous encounters and rapidly respond when exposed again
- Antigenic mass: Quantity of antigen that must be present to be recognized to stimulate the immune system to respond
Passive Immunity

• Derived from sources other than the animal producing its own antibodies

• Includes:
  – Colostrum antibody transfer
  – Antiserum use
  – Antitoxins
Passive Immunity

• Maternal antibody interference
  – Lasts up to 3 months and possibly longer

• Vaccines often ineffective when given to young calves
  – Due to colostrum antibody interference because antibodies in calf’s circulation will attack the vaccine antigen
  – May actually render a calf more susceptible

• Active immune system in calves not fully functional
  – Can take several months to reach full functionality
  – Why it’s so important for calves to get colostrum within first 12 hours following birth
Biosecurity

• Open herd vs. closed herd

Commingling

• Should you do it?
• What is next to your operation/location/ranch?
Herd Health & Management Program

• Essential to maximize production efficiency and reduce production losses
  – Includes vaccination program

• Optimum vaccination programs vary by region, disease exposure, management and other herd specific variables
  – Vaccination protocols may vary considerably between individual operations and locations

• While vaccination can be considered expensive, it can also be an effective risk management tool
  – May save much more than it costs if an outbreak occurs
Disease Prevention

- Disease prevention and proper immune system function help to:
  - Reduce probability/severity of disease outbreaks
  - Reduce severity of disease agents in a herd
  - Improve product value

- Cost/investment of disease prevention is less than the cost of treatment/response

- Many problems can be mitigated with:
  - Good management (including biosecurity)
  - Proper nutrition
  - Vaccination against infectious disease
Vaccines

• Made from viruses and bacteria
• Killed Vaccines
  – organisms are no longer alive
• Modified Live Vaccines
  – organisms are still alive and have ability to replicate in the body, but they have been altered so they don’t cause disease
• Modified live vaccine may produce a higher level of immunity, but also may have a higher level of risk when used in pregnant or stressed cattle
Vaccines

- Following vaccination, healthy immune system will “recognize” the antigens and help the animal fight a natural disease agent when exposed
- Help prevent infectious diseases but do not provide 100% immunity for all animals in herd
- Most raise the general level of herd immunity so the threat is minimized
Vaccine Administration

• Can cause anaphylactic (allergic) reactions
  – Be prepared by having epinephrine available to counteract this if it occurs
• Beef quality assurance
• Injection of vaccines into muscle tissue can cause scar tissue and lesions that affect carcass quality and may cause abscesses
• When possible, select vaccines that are administered sub-Q
  – Give them in the neck ahead of the shoulder
• If vaccine can only be given intramuscularly, always administer in the muscle of the neck in front of the shoulder
Guidelines for Vaccine Care & Handling

• Read the package insert and directions and follow them

• Refrigerate and store vaccines as directed on label.
  – Use well insulated cooler to protect vaccine in the field
  – “Temperature of the vaccine should be at least as important as temperature of the beer on branding day.”

• Mix only the amount of vaccine that can be used within an hour and then mix additional as needed
Guidelines for Vaccine Care & Handling

- Keep mixed vaccine out of direct sunlight, away from heat, and from freezing
  - All of these can render vaccine ineffective
- Remember some modified live vaccines can cause abortion and birth defects if used at the wrong time of year
- Always read the label and be sure the product is suitable for the animals to be vaccinated
- Involve your veterinarian in vaccine decisions
Vaccination Suggestions for Core Diseases

• 1st step in developing vaccination program is to determine diseases that are most likely to impact a cow/calf operation
Breeding Cow Herd Vaccine Programs

• Vaccine programs used in breeding cow herds are primarily designed to prevent against disease that cause reproductive loss, including:
  – Failure to conceive
  – Embryonic death
  – Abortion
  – Stillbirth
• Also protects developing fetus and increases presence of antibodies in colostrum to help protect newborn calf
• In calves, vaccination program is designed to protect against respiratory diseases and diseases that can cause diarrhea and sudden death
Timing of Vaccinations

- Branding and preg-testing provide best opportunities for vaccination in western range management production systems
  - Not always ideal for optimum immunity, especially in calves
- If immune system is compromised at vaccination, likelihood of effective immune response is much lower
  - Caused by stress, poor nutrition, other disease, etc.
  - Giving too many vaccines at one time can affect immune response
Timing of Vaccinations: Calves

• Little protection is provided by some vaccines until 1-2 weeks after booster dose is given (especially in calves)

• Modified live vaccine recommended over killed products in management systems where calves may not be handled more than once
  – Depends on age of calf
  – Ideally, calves should receive booster dose for optimum protection

• If 2 doses are directed, give booster dose or there may be little immunity/protection

• Calves vaccinated ≤ 6 months should receive booster dose
Timing of Vaccinations: Pregnant Cows

• When vaccinating cows to prevent calf-hood diseases, give the last prescribed dose of vaccine at least 4 weeks before calving
  – Optimizes the benefits of the colostrum antibodies

• A vaccine given to pregnant cows does not mean the memory cells are transferred through the placenta to the calf
Viral Disease Vaccines

• May be a combination (multivalent) of the following diseases
  – IBR
  – BVD
  – BRSV
  – PI3
  – Rota-Corona Virus
Viral Disease Vaccines

- **IBR**
  - Cows, bulls, replacement heifers should be vaccinated at least a month before breeding season begins
  - Calves should be vaccinated before weaning and, if possible, given a booster post weaning

- **BVD**
  - Cows, bulls, replacement heifers should be vaccinated at least a month before breeding season begins
  - Calves should be vaccinated before weaning and, if possible, given a booster post weaning

- **BRSV**
  - If cows are to be vaccinated, should be done at least a month before breeding season begins
  - Calves should be vaccinated before weaning and, if possible, given a booster post weaning
Viral Disease Vaccines

- PI3 may be given to calves in combination with the previously mentioned vaccines
- Rota-Corona Virus
  - In herds where these viruses are a problem, the vaccine is typically given orally to newborn calves
Bacterial Disease Vaccines

- May also be combination (multivalent) of several different bacterial components
Leptospiroiosis & Vibriosis

• Vaccines are often given in combination
• Cows, bulls, replacement heifers should be vaccinated at least a month prior to breeding season
• Lepto vaccine should have several strains of the Lepto bacteria included
• May consider giving a booster dose of the Lepto vaccine at pregnancy test time
Clostridium Species Diseases

• Includes:
  – CI perfringens
  – Blackleg
  – Malignant edema
  – Red-water

• Typically given in combination as 7-way or 8-way Clostridium vaccine

• Can be given to cows and replacement heifers at pregnancy testing time to help protect the calf

• Calves should be vaccinated at branding and a booster given prior to weaning
Brucellosis (RB51)

- Should be given to heifers 4-12 months of age.
- Has to be given by licensed and accredited veterinarian

- In some areas of MT, ID and WY, regulatory veterinarians recommend a yearling heifer booster vaccination
- In some herds, adult vaccination may be recommended every 3 or 4 years
  - Depends on risk of exposure
Additional Bacterial Vaccines

- Anaplasmosis
  - In some enzootic areas, veterinarians may recommend vaccinating for this vector-borne disease
- Anthrax
  - In enzootic areas, regulatory veterinarians may recommend vaccination
- Pinkeye
  - Vaccinated for in areas where the problem is prevalent
Protozoal Diseases

• Trichomoniasis
  – If vaccinated for this, should be done at least one month prior to the breeding season
Feedlot Cattle

• Vaccination depends on age and sources of cattle
• Weaned calves and yearlings entering feedlot should be given respiratory complex vaccination (IBR, BVD, BRSV, P13) and Clostridium complex vaccinations
Questions?

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