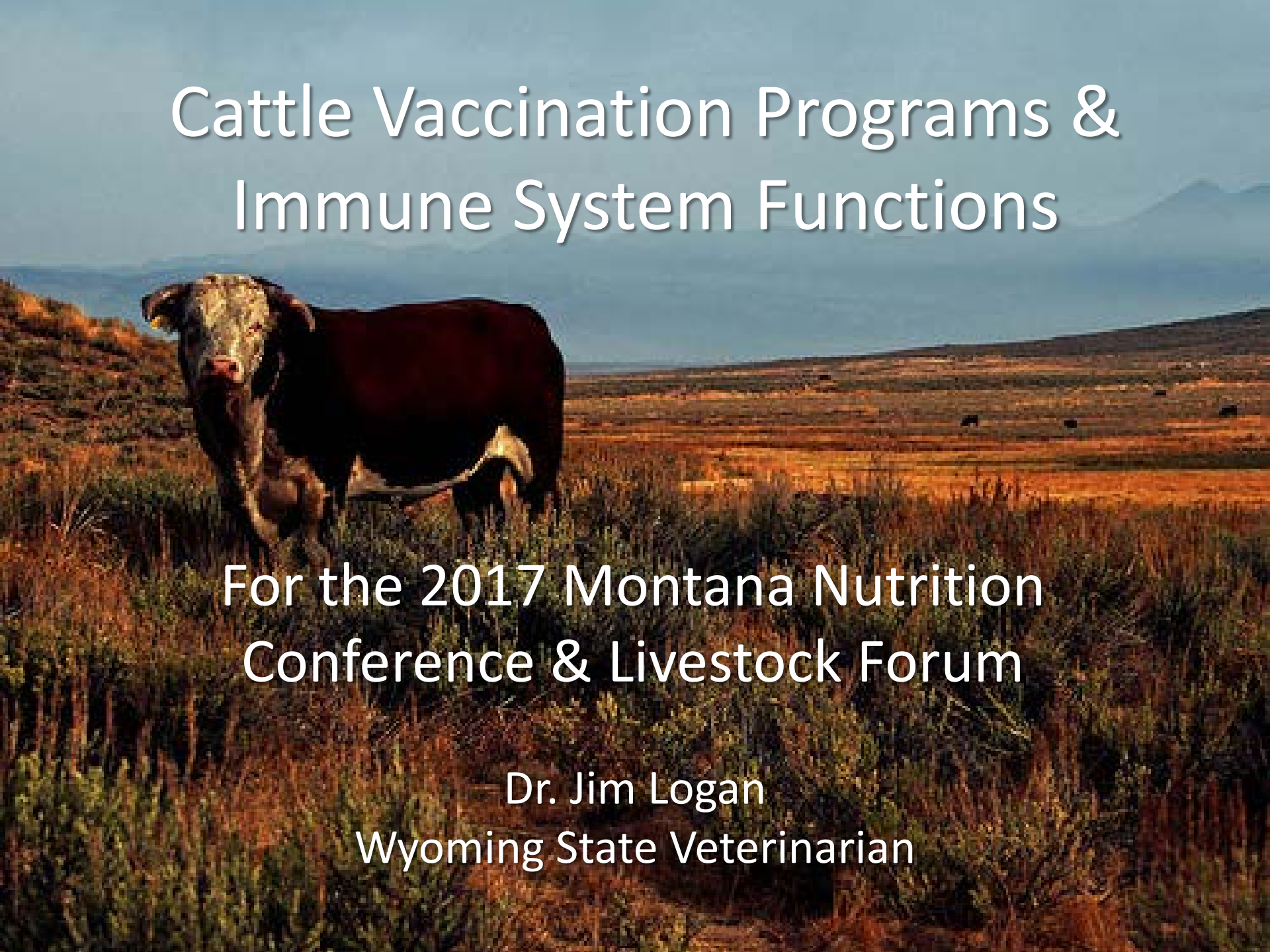
Cattle Vaccination Programs & Immune System Functions



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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 $\leq$ 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

Leptospirosis & 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:
  - Cl 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?

Credits:

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