Key Points on Vaccine Issues

• Modern vaccine technology has afforded effective protection of companion animals against serious infectious diseases

• But, this advancement brings increased risk of adverse reactions (vaccinosis)

• Some are serious, chronically debilitating and even fatal

• Must balance this benefit : risk equation

• “Be wise and immunize, but immunize wisely!” (Dr. Ron Schultz)
Benefits of Vaccines

• More lives saved, more animal production safeguarded than any other medical advance

• Eradicated smallpox, & nearly all polio and measles in people

• First vaccines were against small pox, anthrax, and canine distemper

• Significantly reduced endemics of canine distemper, hepatitis and parvovirus, but not in wildlife reservoirs

• Significantly reduced endemic feline panleukopenia

• Eliminated rabies in Europe; eradicated Rhinderpest in Africa, foot & mouth disease in Europe
Vaccines & Immune Memory Cell Immunity

• Vaccination may not equate to immunization

• But, vaccinated and truly immunized animals should be fully protected from disease

• Immune memory cell immunity should persist life long

• Giving boosters to immunized animals is unwise, as it will introduce unnecessary antigen, adjuvant and preservatives
Sterilizing Immunity =

- An immune response that completely prevents and eliminates an infection.
- Animals properly immunized against the clinically important viral diseases have **sterilizing immunity** that not only prevents clinical disease but also prevents infection. **Only the presence of antibody can prevent infection.**
- **An animal with a positive serum antibody test is protected from infection.**
- Vaccinating that animal would **not** cause a significant increase in antibody titer, but hypersensitivity to vaccine components (e.g. fetal bovine serum) may develop.
- Furthermore, the animal doesn't need to be revaccinated and should **not** be revaccinated since the vaccine could cause an adverse reaction (hypersensitivity disorder).
Sterilizing Immunity (cont’d)

• But, not all vaccines produce sterilizing immunity

• Those that do include: distemper virus, adenovirus, and parvovirus in the dog, and panleukopenia virus in the cat.

• Examples of vaccines that produce non-sterile immunity would be leptospirosis, bordetella, canine influenza, rabies virus, and herpesvirus and calicivirus --- the upper respiratory viruses of cats.

• While non-sterile immunity may not protect the animal from infection, it should keep the infection from progressing to severe clinical disease.
Summary on Vaccine Policy

❖ AAHA 2003 — Current knowledge supports the statement that •••

“No vaccine is always safe, no vaccine is always protective and no vaccine is always indicated”

• “Misunderstanding, misinformation and the conservative nature of our profession have largely slowed adoption of protocols advocating decreased frequency of vaccination”
Summary on Vaccine Policy

❖ WSAVA 2015-2017

From Prof. Michael J. Day •••

- "Vaccination should be just one part of a holistic preventive healthcare program for pets that is most simply delivered within the framework of an annual health check consultation."

- "Vaccination is an act of veterinary science that should be considered as individualized medicine, tailored for the needs of the individual pet, and delivered as one part of a preventive medicine program in an annual health check visit."
Vaccine Adjuvants

• Act to accelerate, prolong, or enhance antigen-specific immune responses

• Added into vaccines to enhance their immunogenicity, but this increases risk of autoimmune and inflammatory adverse events following vaccination

• Killed, inactivated vaccines containing adjuvants make up about 15% of veterinary biologicals used, but have been associated with 85% of the post-vaccination reactions

• Adjuvants have been used safely in human and veterinary medicine for decades, but there is increasing worldwide concern about the safety of using thimerosal (mercury) and aluminum
Vaccine Non-Responders

- Genetic trait; do not breed them
- They will remain susceptible to the disease life long
- Rate = 1:1000 for CPV (parvovirus)
  - Especially Black Labradors and Akitas
- Rate = 1:5000 for CDV (distemper virus)
  - Especially Greyhounds
- Rate = zero for CAV (hepatitis, adenovirus)
- Rate = unknown for cats
Adverse Vaccine Events = Vaccinosis

• How and Why do they occur?
• Millions of people, pets and livestock vaccinated annually
• Reactions relatively rare --- about 3-5 events per 100 vaccines given
• Affects those genetically predisposed
• Can be acute, sub-acute and delayed for 30-45 days
• New data relates vaccinosis to integrity and function of gut microbiome
## Core Vaccines *

<table>
<thead>
<tr>
<th>Dog</th>
<th>Cat</th>
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<tbody>
<tr>
<td>Distemper</td>
<td>Feline Parvovirus</td>
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<tr>
<td>Adenovirus</td>
<td>Herpesvirus</td>
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<tr>
<td>Parvovirus</td>
<td>Calicivirus</td>
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<td>Rabies</td>
<td>Rabies</td>
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* Vaccines that every dog and cat should have
Maternal Immunity & Protection

Milk Replacer

• Feeding milk replacer proteins instead of natural colostrum will coat bowel of newborns and shut down absorption of antibodies needed for protection from disease

• Give FFP (Fresh-Frozen Plasma) immediately to orphan or weak pups to get passive immunity; then add milk replacer

Vaccine Timing

• Last puppy vaccine at 16-18 weeks for protection

• Last kitten vaccine at 12-14 weeks for protection
Vaccine Dosage

Body Mass

- Same dose intended for toy and giant breeds
- Why?
- MLV vaccines -- immunogenic principle *not* based on body mass
- Killed inactivated vaccines -- should be adjusted for body mass
- Minimum/optimum doses for protection?
- Excess antigen present
Vaccine Dosage (cont’d)

Age

• **Optimal age for response**
  12 wks + for puppies
  10 wks for kittens

  Same for all breeds and sizes?

• **Earliest age for safety**
  6 wks for puppies and kittens

• **Effective age varies**

• **Blocking effects of maternal immunity**
You Want To Do What With That Needle?
Kennel Cough & Flu Vaccines

- **Intranasal/Oral Bordetella** releases interferon, which impairs growth of other respiratory viruses (parainfluenza, adenovirus - 2, influenza)
- Injectable Bordetella vaccine does **not** release interferon
- Hypersensitivity reactions with intranasal vaccine
- Kennel cough vaccines **not** 100% effective. Needed?
- **Influenza** (vaccine needed?)
- Produces fever whereas kennel cough does **not**. When combined with Streptococcus, 2-3% can die
Avoid Vaccination

- Period just before estrus (30 days)
- During estrus
- Pregnancy
- Lactation
Periodicity of Booster Vaccinations

❖ No evidence that annual boosters are necessary

❖ Need to lengthen interval
  (every 3-7 years or more for healthy adults)

❖ Geriatric animals vaccinated only with caution

❖ Monitor serum antibody titers instead
  • Protection is indicated by a positive titer result
  • Any measurable antibody level shows protection
Alternatives to Current Vaccine Practices

• Measure serum antibody titers
• Avoid unnecessary vaccines or over-vaccinating
• Caution vaccinating sick or febrile animals
• Tailor specific minimal vaccine protocol for dogs/cats breeds or families at risk for adverse reactions
• Start vaccination series later (9-10 wks, dog; 8 wks cat)
• Alert caregiver to watch puppy/kitten behavior and health after boosters
• Avoid revaccination of those with prior adverse events
Vaccine Conclusions for Canines*

Factors increasing risk of adverse events 3 days after vaccination:

• Young adult age
• Small-breed size
• Neutering
• Multiple vaccines given per visit
• These risks should be communicated to clients

* from Moore et al, JAVMA 227:1102–1108, 2005
The Thimerosal (Mercury)-Free Rabies Vaccine
Rabies Challenge Study Update

• Rabies remains a serious and usually fatal disease in many countries, despite the absence in North America of documented cases of rabies in vaccinated, truly immunized dogs and cats for 2 decades.

• While most pet dogs are vaccinated for rabies, fewer cats have historically been vaccinated until recent laws have required it.

• The Rabies Challenge Fund research studies are now at years 7 and 8; the initial live rabies challenge phase results showed > 85% survival at 5 years.
Footprints in the Sand