

Using Canine Nomographs to Better Time Puppy Vaccinations



Avidog
Changing The Future Of Dogs
One Puppy At A Time

INTRODUCTION

We were introduced to canine nomographs 15 years ago by Dr. Ronald Schultz from the University of Wisconsin's School of Veterinary Medicine. Since then, we have used them to time our pups' vaccinations. This simple, inexpensive tool has enabled us to overcome the two conflicting pressures that dog breeders face—how do we ensure every puppy is fully socialized during its first 16 weeks of age while keeping them safe from distemper and parvovirus?



Nomographs have proven to be the answer for us and thousands of our colleagues and students. So, with the help of Dr. Laurie at the Schultz Lab, we have written this ebook for other breeders. We hope it will be useful to you!

Like you, we are simply dog breeders so be sure to discuss this process with your veterinarians! Feel free to share this booklet with them.

Gayle, Marcy and Lise

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Our thanks to the Schultz Lab, Dr. Ron Schultz and Dr. Laurie Larson for providing this invaluable service to dog breeders and puppy owners across North America!!

Please visit the lab's website for more information and details.

<https://www.vetmed.wisc.edu/lab/schultz/>

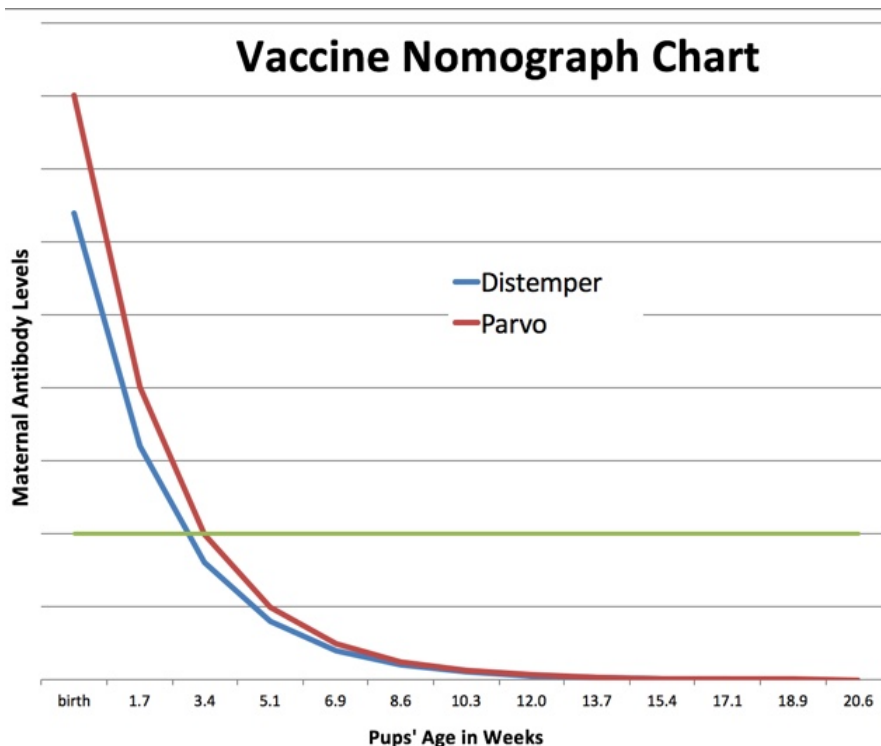
WHAT ARE CANINE NOMOGRAPHS?

Nomographs are simple blood tests that estimate the amount of distemper and parvovirus antibodies passed from a dam to her puppies via her colostrum, or first milk. Nomographs are useful for breeders and puppy owners because they can help predict when pups:

- are no longer protected by maternal antibodies and
- will be able to respond to distemper and/or parvo vaccines.

During a puppy's first 12 hours of life, its intestinal tract allows antibodies in colostrum to pass into the bloodstream and thus start protecting it from the diseases that its mother is protected from. As the puppy grows up, maternal antibodies break down in approximately two-week "half lives" until they are no longer present in the pup.

While a puppy's maternal antibodies are high, they neutralize viruses such as canine parvovirus and canine distemper virus. This keeps the pup safe from these potentially fatal diseases. However, this same neutralization also blocks vaccines so the puppy will not be able to be immunized.



Maternal antibodies against distemper and parvo are independent of each other; a bitch can and usually will have different levels of protection against these diseases. In our experience, bitches' titers can range from as low as 4 and as high as 5280. These levels mean a pup's maternal antibodies can disappear as early as a few days after birth to as late as 18 weeks of age! With these last pups, if we had stopped vaccinating them at 16 weeks, as is commonly done, the pups would not have been protected!

In fact, maternal antibody interference is one of the most common causes of vaccine failure in puppies! We usually give pups multiple doses of vaccine every two to three weeks during puppyhood because we don't know their maternal antibody titers. So, we don't know when a vaccine will be effective. Nomograph testing helps us understand the best timing of vaccination to ensure a litter will be effectively immunized with the fewest vaccines as early as possible in their life.

We can measure the antibodies that a bitch has to pass on to her puppies using antibody titers, a simple blood test. If that test is done at the Schultz Laboratory at the University of Wisconsin Veterinary School, a nomograph can then be run on those results, allowing us to predict the optimal time to vaccinate her puppies.

USING A NOMOGRAPH FOR YOUR LITTER

To use a nomograph to better time your litter's distemper and parvo vaccinations, you will need to ship serum from your bitch to the Schultz lab. The ideal time for the blood draw is either two weeks before or two weeks after the puppies are whelped. You may find it more convenient to do the blood draw when your bitch is at your veterinarian's for progesterone testing or a pregnancy ultrasound. Similarly, bitches that are bred more than once a year do not have to have a second nomograph that year. However, the further from whelping the blood is drawn, the more risk you take that your bitch has come in contact with distemper or parvo and mounted an immune response that won't be revealed in her titer. You'll have to decide how great that risk is based on your bitch's activities and the amount of parvo or distemper in your area. Personally, we stick with drawing blood either two weeks before or two weeks after whelping.

Prepare and ship the blood according to the Blood Preparation Procedures in the next section and the Nomograph Submission Form on page 10. Follow the example submission form on page 11. It is particularly helpful to the lab if you provide your dam's vaccination history. At a minimum, fill out her distemper (CDV) and parvovirus (CPV-2) vaccination history.

Nomograph Report. In about a week, you will receive an email report from the lab similar to the one on page 12. The report will give you your bitch's parvo and distemper titers in the box, and then below that is the protective standard for this lab. A little further down the page will be the nomograph information for the litter, indicating the age at which the pups can be vaccinated and for which diseases. On these reports, **D** indicates a distemper vaccine, **A** indicates an adenovirus-2 vaccine, and **P** indicates a parvovirus-2 vaccine. The report then goes on to give further information about confirming the pups' immune response.

Pups' "At-Risk" Period. Prior to the recommended vaccination dates, the pups are at risk for getting distemper or parvo if they come in contact with it. At the same time, it is critical that we fully socialize and develop our pups prior to 16 weeks of age. So breeders must practice good biosecurity while still socializing puppies during the weeks prior to the vaccinations. If you want to know more about how to do this, check out Avidog's Transformational Puppy Rearing video series (www.avidog.com/request-rbp-vod/).

Send Reports to New Homes. Provide a copy of the nomograph report with each pup's vaccination record to its new owners so they can provide them to their veterinarian on the first visit. This enables the pup's vet to tailor the pup's vaccines to its individual needs.

Confirming Pups' Responses to Vaccines. Every pup, no matter what vaccination protocol it receives, should have a confirmatory titer drawn to ensure that it is protected. We have personally bred litters that could and did not respond to the parvo vaccine until after 17 weeks of age. If their owners had stopped vaccinating at the typical 16 weeks, those pups would have been left unprotected against parvo. They would have had a good chance of coming down with the disease in their first year, since they were competition dogs and thus out and about.

You or your owners can use the Schultz lab for your pups' confirmatory titers. Use the same submission form and blood draw instructions but this time, do not check the nomograph block. Attach a copy of the dam's nomograph with the submission form. You will receive a report like the one on page 13.

If an owner doesn't do a confirmatory titer after the puppy series, that pup should be vaccinated against distemper, parvo and adeno at a year of age, when all chance of maternal antibodies is gone.

High Risk Conditions. In high risk situations, such as kennels that have had parvo outbreaks, you should take the additional step of running a titer on at least one

pup in a litter BEFORE vaccination is begun. The nomograph on the dam is helpful, but a pup's actual antibody level provides even better information in this risky situation.

When Not to Use Nomographs. Nomographs are useful tools to help breeders predict when vaccinations can be successful in their pups. However, to successfully use nomographs to schedule a puppy's distemper and parvovirus vaccines, that puppy must have **ingested colostrum from its dam during its first 12 hours of life**. If for some reason that did not happen, either due to issues with the puppy or its mother, then a nomograph cannot be used and the puppy should be vaccinated using the more standard vaccination protocols, like those recommended by the World Small Animal Veterinary Association, which can be found at www.wsava.org/guidelines/vaccination-guidelines.



BLOOD PREPARATION PROCEDURES FOR A NOMOGRAPH

- Plan to draw your bitch's blood **two weeks prior to or two weeks after whelping**. Avoid drawing blood closer to whelping than these dates because the bitch's body is creating colostrum and the nomograph will be less accurate. At the same time, if you draw her blood too far from whelping, you risk her coming in contact with distemper or parvo closer to whelping, which will change the antibody levels the pups get in her colostrum.
- Ship your bitch's blood to arrive at the lab Monday through Friday. Drawing and shipping blood **Monday, Tuesday or Wednesday** is usually best.
- Collect 1 to 3 mls of blood from your bitch in a **sterile, red top or serum separator tube** and allow it to clot.
- Spin down to separate the serum. Send at least **½ ml of serum** for the testing.
- Wrap the tube with the serum in **padding**, such as paper towel, and place it in a plastic zip-lock bag.
- Fill out the **submission form** (see sample form) and place it with a **\$25 check made payable to the University of Wisconsin** in a **SECOND** plastic zip-lock bag. (Please note this fee is expected to go up at some point in 2017, so you may want to call the lab to ensure you send the proper amount.)
- Place both plastic bags in a **sturdy shipping container**, either a padded envelope or box. If the ambient temperature might go above 80°F during shipping, include a cold pack wrapped with some newspaper to keep it from crushing the serum vial. Freezing temperatures aren't a concern when shipping separated serum.
- Send the shipping container via **USPS 2-day Priority Mail** to this address. Overnight shipping is not necessary.

Dr. R.D. Schultz Laboratory
4337 School of Veterinary Medicine
2015 Linden Drive West
Madison, WI 53706
(608) 263-4648

- The lab usually runs tests on Fridays and will send you and your vet a report via email (see sample report) that gives you the following, usually a week after receiving the blood sample:
 - your bitch's quantitative titers for distemper and parvo,
 - an interpretation of these results for her, and
 - recommendations for which weeks to vaccinate her puppies.

RESOURCES

American Veterinary Society of Animal Behavior. 2008. *AVSAB Position Statement On Puppy Socialization*. Available at www.avidog.com/wp-content/uploads/2014/02/AVSAB-Position-on-Puppy-Socialization.pdf

Baker JA, Robson DS, Gillespie JH, Burgher JA, Doughty MF. 1959. A nomograph that predicts the age to vaccinate puppies against distemper. *Cornell Vet*. 1959 Jan;49(1):158–167.

Ronald D Schultz Lab. 2016. *Canine Nomograph – What is it?* Available at www.vetmed.wisc.edu/lab/schultz/canine-nomograph-what-is-it/

WSAVA Vaccination Guidelines Group. 2015. *World Small Animal Veterinary Association 2015 Vaccination Guidelines for The Owners and Breeders of Dogs and Cats*. Available at www.avidog.com/wp-content/uploads/2016/12/WSAVA-Owner-Breeder-Guidelines-14-October-2015-FINAL-1.pdf



NOMOGRAPH SUBMISSION FORM



Dr. R.D. Schultz Laboratory
 4337 School of Veterinary Medicine
 2015 Linden Drive West
 Madison, WI 53706 (608) 263-4648



Canine Serum Submission Form

Owner name: _____

Address: _____

Owner's email: _____ Veterinarian's email: _____

Serology results will be sent to the owner and the veterinarian.

Pet name: _____ Age: _____ Breed: _____

Sex: Male Male/Neutered Female Female/Spayed

Date of last vaccination: _____ Is this sample for a NOMOGRAPH? Yes No

If known, please list brand(s)/manufacturer(s) of vaccine (e.g. Duramune, Boehringer Ingelheim, Fort Dodge; Vanguard, Pfizer; Recombitek-Merial; Proguard, Continuum, Galaxy, Intervet, Schering-Plough): _____

Please list if/when your dog received the following:

Vaccine Type	Yes	No	Date (if known)	Info. Not Available
Canine Distemper Virus (CDV)				
Canine Parvo Virus (CPV-2)				
Canine Adenovirus (CAV-2)				
4-way injectable (CDV, CPV-2, CAV-1&2, CAV-2)				
5-way injectable (CDV, CPV-2, CAV-1&2, CAV-2, CpiV)				
Leptospira 2-way (<i>canicola</i> and <i>icterohaemorrhagiae</i>)				
Leptospira 4-way (<i>canicola</i> , <i>icterohaemorrhagiae</i> , <i>grippityphosa</i> , <i>pomona</i>)				
Canine Corona Virus				
Rabies				
Canine Influenza				
Others				
Bordetella (kennel cough) If yes, please indicate if intranasal (IN) vaccine or injectable (IJ) vaccine.				
2-way (Bordetella, CPiV)				
3-way (Bordetella, CPiV, CAV-2)				

How many dogs live in this household? _____

Does this dog board at a commercial kennel? Yes No

When was the last time it was at a kennel? (Please list date) _____

Does this dog attend training courses, doggy daycare, etc.? Yes No

Please enclose a check made out to the University of Wisconsin for \$25.00 to cover the cost of CDV and CPV-2 titers. Thank you for your help with our study!

Serum submissions become property of the Dr. R. D. Schultz Laboratory.

SAMPLE NOMOGRAPH SUBMISSION FORM



Dr. R.D. Schultz Laboratory
 4337 School of Veterinary Medicine
 2015 Linden Drive West
 Madison, WI 53706 (608) 263-4648



Canine Serum Submission Form

EXAMPLE

Owner name: Gayle Watkins
 Address: 1234 Main Street, Somewhere, NC 12345
 Owner's email: info@avidog.com Veterinarian's email: vet@avidog.com

Serology results will be sent to the owner and the veterinarian.

Pet name: Glee Age: 5 Breed: golden retriever
 Sex: Male Male/Neutered Female Female/Spayed
 Date of last vaccination: 4/28/2012 Is this sample for a NOMOGRAPH? Yes No

If known, please list brand(s)/manufacturer(s) of vaccine (e.g. Duramune, Boehringer Ingelheim, Fort Dodge, Vanguard, Pfizer; Recombitek-Merial; Proguard, Continuum, Galaxy, Intervet, Schering-Plough): Progard Puppy DPv

Please list if/when your dog received the following:

Vaccine Type	Yes	No	Date (if known)	Info. Not Available
Canine Distemper Virus (CDV)	✓		4/28/12	
Canine Parvo Virus (CPV-2)	✓		4/28/12	
Canine Adenovirus (CAV-2)				
4-way injectable (CDV, CPV-2, CAV-1 & 2, CAV-2)				
5-way injectable (CDV, CPV-2, CAV-1 & 2, CAV-2, Cpi V)				
Leptospira 2-way (<i>canicola</i> and <i>icterohaemorrhagiae</i>)				
Leptospira 4-way (<i>canicola</i> , <i>icterohaemorrhagiae</i> , <i>grippityphosa</i> , <i>pomona</i>)				
Canine Corona Virus				
Rabies	✓		5/28/12	
Canine Influenza				
Others				
Bordetella (kennel cough) If yes, please indicate if intranasal (IN) vaccine or injectable (I) vaccine.				
2-way (Bordetella, CPiV)				
3-way (Bordetella, CPiV, CAV-2)				

How many dogs live in this household? 3
 Does this dog board at a commercial kennel? Yes No
 When was the last time it was at a kennel? (Please list date) _____
 Does this dog attend training courses, doggy daycare, etc.? Yes No

Please enclose a check made out to the University of Wisconsin for \$25.00 to cover the cost of CDV and CPV-2 titers. Thank you for your help with our study!

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SAMPLE NOMOGRAPH REPORT (DAM)



Owner name: Gayle Watkins

Pet name: **"Glee"**

Please find below the results of the serologic (antibody) test for your dog.

Animal ID	CDV SN	CPV-2 HI
"Glee"	128	40

An SN titer for CDV ≥ 8 and an HI titer for CPV-2 ≥ 40 are considered protective when:

- 1) The dog is 18 weeks of age or older AND
- 2) The dog was vaccinated 2 or more weeks prior to the time the blood sample was collected.

Nomograph for Glee's puppies:

- Monovalent CPV-2 should be given at 6-7 weeks of age
- First dose of DAP should be given at 9 to 10 weeks of age
- Second dose of DAP should be given at 12-13 weeks of age

This nomograph is unique to this dam and is an estimate of the age at which the maternal antibody that this mother passes to her pups will be dissipated and no longer capable of interfering with pup vaccination. This estimate is based on her antibody titers against each virus, CDV and CPV-2, which decrease in roughly 2 week half-lives in her pups.

It is strongly recommended to titer test pups at approximately 16 weeks (at least two weeks after the original puppy shot series has been completed) to determine that they have responded. We recommend that, unless an adverse reaction has been observed, all dogs be given DAPP combo vaccine at one year of age, and then no more frequently than every three years.

There is a small percentage of "non-responder" dogs that are unable to develop an antibody response to CPV-2 (estimated 1 per 1,000 dogs) or CDV (estimated 1 per 5,000 dogs). These dogs will not develop detectable antibody after vaccination. A dog will be a non-responder to one virus or the other (but very rarely to both) and will remain susceptible, most likely for life. When the non-responder dog is exposed and infected with the virus, it will very likely get diseased and die. Non-responsiveness is genetically determined; therefore certain breeds or especially families of dogs will have a higher number of non-responders than would be found in the general population of dogs (estimated above). (Schultz, RD and Larson, LJ, unpublished data.)

SAMPLE NOMOGRAPH REPORT (FINAL FOR PUPPY)



23 Nov 15

Owner name: Gayle Watkins

Pet name: "Glee's yellow puppy"

Please find below the results of the serologic (antibody) test for your dog(s).

Animal ID	CDV SN	CPV-2 HI
"Yellow"	128	5120

Canine Distemper Virus (CDV) antibody titer

The antibody titer was determined by the serum neutralization (SN) test.

Canine Parvovirus Type 2 (CPV-2) antibody titer

The antibody titer was determined by the hemagglutination inhibition (HI) test.

An SN titer for CDV ≥ 8 and an HI titer for CPV-2 ≥ 40 are considered protective when:

- 1) The dog is 18 weeks of age or older AND
- 2) The dog was vaccinated 2 or more weeks prior to the time the blood sample was collected.

What if the titer is less than 8 (SN) for CDV and/or less than 40 (HI) for CPV-2?

Revaccination with either a monovalent vaccine [specific for the virus (e.g. CDV, CPV-2) for which there is low or no antibody titer] or a combination vaccine (e.g. CDV, CPV-2, CAV-2, etc.) is highly recommended!

With regard to the titer, a very high titer does not mean the dog is more immune than the one with the low titer. If the CDV antibody titer is 8 in dog A and it is 1024 in dog B, both dogs are equally immune to CDV.

There is a small percentage of "non-responder" dogs that are unable to develop an antibody response to CPV-2 (estimated 1 per 1,000 dogs) or CDV (estimated 1 per 5,000 dogs). These dogs will not develop detectable antibody after vaccination. A dog will be a non-responder to one virus or the other (but very rarely to both) and will remain susceptible, most likely for life. When the non-responder dog is exposed and infected with the virus, it will very likely get diseased and die. Non-responsiveness is genetically determined; therefore certain breeds or especially families of dogs will have a higher number of non-responders than would be found in the general population of dogs (estimated above).



Avidog International provides continuing professional education for dog breeders based on current and past research, as well as over 60 years of joint breeding experience. Visit our Breeder College for courses, products, ebooks and more.

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