

Control of Paramyxovirus-1 (PMV-1) Infection in Domestic Pigeons

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It was just over a year ago that I first heard from Joe Quinn as chairman of The National Avian Disease Task Force for Pigeons and Doves. He was looking for a licensed laboratory to develop and produce a vaccine for Avian Paramyxovirus Type 1 (PMV-1). At that time I had absolutely no conception of the pigeon business. However, I had been in the chicken vaccine business for 28 years. My lab was the first U.S. lab to introduce a killed virus Newcastle Disease vaccine some 25 years ago and we have made many advances since then. Newcastle is also a Type I Paramyxovirus and very similar to the PMV-1 of pigeons. So it seemed logical that we could produce a PMV-1 vaccine for pigeons. I studied the scientific literature and found that most of the work had been done by Dr. Alexander in England who showed distinct differences between the pigeon virus and the chicken virus. Although it is the same virus as Newcastle Disease Virus in chickens, it has changed. It has become adapted to pigeons. It now causes a serious disease in pigeons but not in chickens. From his work, and from experience in Europe it was obvious that live virus Newcastle Disease Vaccine for chickens provided only poor protection in pigeons. On the other hand, the killed virus Newcastle Disease Vaccine has been extensively used in Europe with apparent success.

I could have recommended the use of our regular Newcastle Disease Vaccine—Killed Virus and I believe it would have provided reasonably good protection. However, I considered the degree of exposure from contact that pigeons are subjected to in races and

shows and from buying and selling. I also considered the high value of some pigeons, both monetary and sentimental. I also considered that there were distinct serological differences between the chicken virus and the pigeon virus. I decided that I should provide the most effective vaccine possible. This would have to be a vaccine produced with the actual pigeon virus. So this is what we used to make the vaccine.

Before discussing this vaccine I'd like to discuss the disease itself. PMV-1 was first diagnosed in pigeons in The Sudan and Egypt in 1981. It was diagnosed in Italy and Spain in early 1982. It only took about a year for it to spread throughout Europe. PMV-1 was first diagnosed in pigeons in England in May of 1983, and in New York in early 1984. In England, by law, all outbreaks must be reported to the government. There were 192 outbreaks reported in 1983. They determined that 133 (or 70%) of these cases were caused by racing pigeon contact. Most of these outbreaks occurred in August, September and October (during the young bird racing season). Although a killed virus vaccine became available, only a small percentage of the flyers used it. There were many false fears about the use of a vaccine that had to be injected. So, the virus continued to spread. There were 810 cases reported in 1984. I am told that the situation has been as bad in 1985.

The spread of PMV-1 in the U.S.A. is difficult to determine. Most cases are not taken to a diagnostic lab or to a veterinarian. There is no federal system of reporting such as is present in England, so most cases are not reported. Many fanciers seem to regard it as a social disease and try to hide it. This, of course, leads to further spread. PMV-1

was first diagnosed in New York City and Long Island in early 1984. By late 1984 it spread to Connecticut, New Jersey, Pennsylvania and Maryland. During the 1985 old bird racing season it reached epidemic proportions in eastern Pennsylvania, Delaware, northern Maryland and some areas of New Jersey. It was also serious in some parts of Ohio.

During the late summer and fall I have heard of relatively few isolated infections. I have been told that it has been a continuing problem in New Jersey and New York. Usually these reports are hard to confirm but I believe they have occurred in California, Arizona, Florida, Missouri and probably many other states. In Canada, PMV-1 has been diagnosed in several western provinces, where the disease was introduced by birds imported from Belgium. Being aware of the rapid spread of PMV-1 in some areas during the *old* bird racing season, I expected to see an even worse situation during the young bird racing season. Keep in mind that this was the time of the greatest spread in England. However, as near as I know, it did not occur. Perhaps I am not close enough to the "grapevine" to really know what is happening. However, in late October and November I am aware of a large number of serious outbreaks of PMV-1 that have occurred in Massachusetts, where one loft lost 36 of 56 birds. Joe Quinn told me that there has also been at least eight outbreaks in the Columbus, Ohio area with 90 of 120 birds dead in one loft. Perhaps this is the end result of infection spread during the young bird racing season that didn't show up until later. Unfortunately, the flyers are still trying to keep it quiet.

I am positive of one case of PMV-1 in fancy pigeons in Maine, because I diagnosed it. This was a case of a breeder buying two pigeons at a show in New Hampshire. A few weeks later, he saw symptoms and took this bird to a poultry diagnostic laboratory with which I am associated. We made a tentative diagnosis of PMV-1 (which was later confirmed) and he immediately vaccinated his loft. I can't help but believe that this same thing has happened many times in other states.

I will briefly describe the symptoms of PMV-1. An early symptom is loose droppings but this could be caused by many conditions. PMV-1 affects the bird's nervous system. Early symptoms are incoordination causing difficulty in flying, walking or eating. This progresses into trembling, twisted necks, paralysis of one or both wings or legs,

and often terminates in complete paralysis and death.

The onset of disease varies greatly between lofts. I've heard of a few cases where many sick birds are seen rapidly. However, in most cases, the diarrhea may be seen, but the nervous symptoms are only seen in a few birds. Usually these birds are killed, but it then shows up in a few more, and then in a few more. This can go on over a period of several weeks. I am aware of cases where over 50% show nervous symptoms before it runs its course. If you have several separate lofts, it may appear to take several weeks for the disease to spread from one loft to another. Actually the virus may spread more rapidly but the nervous symptoms develop slowly. The long incubation period is the one characteristic of PMV-1 that makes it very difficult to control. It may take as long as four weeks from infection before symptoms develop. A well intentioned owner may enter his perfectly normal appearing pigeons in a race, or a show, or sell one to his best friend. Although they may appear perfectly normal they could have been exposed and infected with PMV-1, and spreading the virus.

In the chicken business, we control certain diseases by what we call security management. This is simply the prevention of any contact between flocks by people, by equipment, and most important by movement of birds. However, pigeon fanciers do just the opposite. They bring together pigeons from many lofts for racing or for shows. This is especially true of racing pigeons where birds from many lofts are transported to races. This is ideal for disease transmission. Remember what I said earlier about the long incubation period of PMV-1. Normal appearing birds may be transmitting the disease. Think how many pigeons and lofts could become exposed to one infected loft during the racing season. In June of this year, we saw a perfect example of this during the old bird racing season in the area between Philadelphia, Pennsylvania and Wilmington, Delaware. Within a period of two weeks, there must have been at least 100 lofts that broke with PMV-1. Thousands of pigeons were rapidly vaccinated, but for many lofts, it was too late.

These are the results of two trials which we conducted with this vaccine. In each trial we vaccinated 10 pigeons and kept another 10 pigeons as unvaccinated controls. At 4 weeks after vaccination, we challenged all birds with a highly pathogenic strain of PMV-1 virus.

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All of the unvaccinated birds showed nervous symptoms, some very severe. In both trials, 90% of the vaccinated birds remained well. This indicates very good immunity from one vaccination.

MBL PMV1-KV TRIALS

Trial	Vaccine	% Protected Against Challenge*
#1	PMV1-KV	90
	None	0
#2	PMV1-KV	90
	None	0

* Challenged by I.M. injection at 4 weeks post-vaccination.

Our Avian Paramyxovirus Vaccine-Type I, Killed Virus was granted a U.S. Conditional License on March 1, 1985. In the last 9½ months we have sold about 800,000 doses. From what I am told, this would vaccinate less than 10% of the domestic pigeons in the U.S.

The vaccine is safe but must be injected properly. It is not difficult if a few simple rules are followed. Have a partner hold the bird in a manner which allows you easy access to the neck area. Spray the lower portion of the neck with rubbing alcohol until the feathers are wet (a spray bottle or plant mister works well for this purpose). Grasp the skin in the midportion of the neck, pinch it between the thumb and forefinger, and lift it upward to form a "pocket" beneath the skin. Move the wet feathers out of the way so that the skin is visible. Carefully insert the needle through the skin in the midline of the neck. Do not inject through the skin on the side of the neck because there are large numbers of blood vessels found in this area which could be damaged by the needle. A slight resistance should be felt as the needle first penetrates the skin followed by the needle easily sliding through the skin into the pocket. If this difference in resistance is not felt the end of the needle may be inside the skin. If the vaccine is injected into the skin you will see the white vaccine inside the skin. This may develop into a hard lump or scab which will eventually disappear.

Special care must be taken vaccinating pigeons with tight neck skin (such as the Maltese) to avoid injecting the vaccine into the muscles of the neck as this may cause muscle damage.

Some fanciers prefer to vaccinate with the syringe pointed toward the body while others prefer to point the syringe toward the head. We suggest that you try both ways and use the method you feel most comfortable

with. The important thing is to inject the vaccine into the pocket under the skin and not into the skin or the muscle of the neck.

A dose of ½ ml. (0.5 ml.) must be injected after the needle is inserted into the bird. This is equivalent to one squeeze of the Jecta-Matic syringe or the distance between the larger markings of the 2.5 ml. disposable syringes (5 of the smallest markings). After injecting the vaccine, withdraw the needle at the same angle as it was injected.

Practice on your least valuable birds first. Take special care to avoid injecting yourself. Cover the needle when not in use. The needle should be wiped with an alcohol swab after injecting each bird.

As I said before, if used properly, the vaccine is very safe. Dr. Basil Tangredi of Long Island who conducted the first clinic reported that some 10,000 birds had been vaccinated with no problems except for one loft. This must have been faulty injection. Dr. H. Wesley Towers of Maryland reported that he vaccinated over 700 pigeons with no problems. Ron Liszcz of Reading, Pennsylvania engaged a man to do the vaccinating of his birds and others in the club. This man also vaccinated for other clubs. Last July I received a report that he had vaccinated over 15,000 pigeons. There had been practically no mortality at the time of vaccination or subsequent problems related to the vaccination.

It is important to realize that the vaccine is a preventative—not a treatment. It must be used to protect the birds before they become exposed to the virus. The vaccine is produced in oil emulsion. This is designed to cause the vaccine to be absorbed slowly. It is like vaccinating the pigeons every day for many days. However, with this type of vaccine, the immunity develops less rapidly. It will take from three to four weeks to develop maximum immunity from the first vaccination. For maximum protection, two injections should be given. The first vaccination sensitizes the pigeon to the virus. The second vaccination produces a much higher level of immunity that persists much longer.

Vaccinated PMV1-KV	Revaccinated PMV1-KV	PMV1-Hi Titer	
		4 Wk PV	8 Wk PV
Yes	No	10	16
Yes	Yes	10	83
No	No	0	0

We very recently tested the immunity of pigeons after one and two vaccinations. Four weeks after the first vacci-

nation, we had average HI titers of 1/10. Four weeks later or eight weeks after vaccination the birds that had only one vaccination had average titers of 1/16. The other group (four weeks after re-vaccination), had average titers of 1/83. This shows that the second vaccination is necessary to get the best immunity. However, the level of immunity does gradually diminish and your old birds should be given a so-called "booster" vaccination every year. This should be done at the most convenient time. In breeders this could well be just prior to mating. Then the breeders would not have to be disturbed during the breeding season. In racers or show birds it should be done at least four weeks before racing or showing. This would provide a high level of immunity for the time of greatest potential for exposure.

During the old bird racing season, I had many calls from flyers who had seen symptoms of PMV-1 in their lofts. Many lofts were vaccinated after the infection was present. I have several reports where the Killed Virus PMV-1 vaccine had been used very early in the course of the infection, and very good results had been seen. However, if the disease becomes well established, the vaccine may be of little value. The vaccine must have time to establish immunity before the infection of the individual birds. It has been surprising to me how fast the vaccine appears to head off the spread of the disease. Some infected lofts have reported that after vaccination, only a few more adults have shown nervous symptoms. However, the youngsters usually don't fare as well. When youngsters are infected, it is not unusual to lose 100%. When this occurs it is necessary to vaccinate the youngsters before they become infected. In one loft, 10 day vaccination turned 100% mortality into 100% livability. However, in some lofts the young start dying at a few days of age and there is little that can be done. I have talked to one man in New Jersey who had vaccinated five- and six-day old birds and kept them alive and healthy when all others were dying. This definitely isn't recommended but can be done in an emergency. The pigeon fancier has got to realize that this is a prevention—not a treatment, and should be used *before* infection occurs.

There have been many questions about the use of live virus Newcastle Disease Vaccine. A trial was conducted by Dr. Dennis Alexander of the Central Veterinary Institute, Waybridge, England. He used both live virus and killed virus Newcastle Disease Vaccine

with the following results:

Newcastle Vaccine		% Protected
1st Vac.	2nd Vac.	Against Challenge
Live	Live	20
Live	Killed	50
Killed	Killed	90

There have been a lot of pigeons vaccinated with Newcastle Disease Vaccine, B1 strain in the U.S. The vaccine that has generally been used is TwinVax. Probably many of you have heard of TwinVax but may not know what it is. TwinVax is a trade name of American Scientific Laboratories. The product is a combination Newcastle Disease (B1 strain) Bronchitis Vaccine produced for chickens. Every poultry vaccine lab in the country (including MBL) produces a similar product. Over the past few months, I have received a number of phone calls from the greater New York city area from breeders who used TwinVax and have had subsequent outbreaks of PMV-1. Here again, I expect that most outbreaks are not reported. There is no doubt that it gives some degree of protection but I doubt that it is adequate.

I have just completed my own trial comparing KV and LV vaccine. I was interested in the B1 strain of ND which has been used in the U.S.A. I obtained pigeons from Cornell University for this trial, so that they would all be of the same breeding and age. We vaccinated groups of 10 pigeons each as follows: 1. With ½ ml. (1 dose) of killed virus vaccine from MBL, 2. With B1 Newcastle Vaccine—giving 1 drop in each eye and in each nostril, and 3. Control group with no vaccination. We gave four drops of each live virus vaccine because this is a recommendation from Europe and to give the LV vaccine every chance for success. We concluded that this procedure was much more laborious and time consuming than injection of the killed virus vaccine. At six weeks after vaccination, all birds were challenged with the pigeon PMV-1 virus.

Symptoms were seen in 90% of the unvaccinated controls.

The killed virus vaccine group had 100% protection.

In this trial, the protection from the live virus (B1) vaccine was much better than in the trial conducted by Dr. Alexander. However, it must be considered that these pigeons received four doses of vaccine in both eyes and the nostrils. Also, the birds were challenged only six weeks after vaccination. This level of immunity would be expected to decrease rapidly.

So little work has been done in

pigeons, and so much work has been done in chickens that we should apply this knowledge whenever applicable. In chickens, we know that the B1 strain vaccine produces low levels of immunity and must be repeated frequently to maintain satisfactory immunity. This is commonly used in broilers that only have about 7 weeks to live, or as a first vaccination of layers. We know that the killed virus ND vaccine produces the highest and longest lasting levels of immunity. This is commonly used for breeder hens which are the most valuable. This immunity is also passed through the egg to the baby chick to provide it with immunity. It would appear to me that the last situation—breeder hens—is most similar to the pigeon situation. The pigeon breeder should rely on the vast experience of chicken breeders in dealing with this disease. Therefore, I would have to definitely recommend the use of the killed virus vaccine.

Perhaps it might be practical to consider the use of the B1 strain as a first vaccination in youngsters, to be followed with the killed virus vaccine. However, I feel that if this is done, a very high potency live virus B1 vaccination should be used. Keep in mind that there have been failures where only the live virus vaccine has been used. It should only be considered as a primer for the later use of the killed virus vaccine. However, even the best immunity wears off and the old birds should be revaccinated annually with the killed virus vaccine to maintain good immunity.

In conclusion, I was asked to provide a killed virus vaccine that was effective against PMV-1 in pigeons. Starting from scratch, I had a licensed vaccine in record time. There wasn't time to get all of the answers. But at this time, after eight months of use, I feel that the vaccine has been very successful. I am not aware of any failures. But it must be used before the disease strikes. Pigeon fanciers have had a negative attitude (or a wait-and-see attitude). Too much emphasis has been put on the one or two birds that died from the injection. This is insignificant compared to the thousands that have died from the disease. Because of the very nature of the pigeon hobby, this disease will spread to most areas of the United States, unless large numbers of pigeons are vaccinated. If you are going to fly or show, or buy or sell, or even visit—sooner or later you are going to have to vaccinate. I can only urge you to do so before your pigeons are exposed to Paramyxovirus—Type 1. ●

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