

the sky will turn black and
a great plague will descend
the earth will crack and the

blood will come raining down..
upon every living thing..
seas will boil over..

A shot in the dark

Opinion is divided on vaccinating and boosting – but Leptospirosis seems the most controversial of all debates. We delve into the pros and cons, so you can weigh up the risks yourself...

A FEW ISSUES AGO (June 2006) *Dogs Today* carried a very sad story about Spangler, a Golden Retriever that seems to have died from a severe reaction to his annual vaccination. In the letters that followed, we received a request from Blue Zebra - a PR firm acting on behalf of Intervet, a major vaccine manufacturer - asking to put forward the other side of the argument, outlining the benefits of vaccination; something they felt was "a particularly relevant issue considering the recent Leptospirosis outbreaks across the UK."

Naturally we were alarmed by the frightening possibility of an epidemic but also puzzled, as our many contacts in the dog world, from vets to breeders to owners, had no knowledge of any such outbreaks. However, we welcomed the chance to find out more about Leptospirosis and its vaccine, especially in view of the fact that several canine vaccine experts in the United States were sceptical of its use - given that it does not cover all strains of the bacteria a dog might meet; it does not seem to confer immunity beyond a few

months; there is ambiguous evidence over the real threat from the disease; and the vaccine itself has a reputation for being the one most commonly associated with serious side effects.

Dr Ronald Schultz, one of the world's leading authorities on veterinary vaccines, says, "I find there's still a fairly high percentage of dogs that do not respond to the Leptospirosis vaccine. In addition, of all the bacterin vaccines, Leptospirosis causes the most adverse reactions."

Given that its effectiveness has been questioned and the risks highlighted, was this really a vaccine worth having, we wondered?

Intervet's PR company seemed keen to provide some answers. Unfortunately, when the response finally arrived, not all our questions were addressed. In particular, Intervet did not substantiate its claims regarding the Leptospirosis outbreaks, instead citing just one anecdotal account of an unvaccinated working Labrador that had died from the disease.

So we decided to launch our own





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investigation and take a deeper look at Leptospirosis - just how much of a threat is it and how effective is the vaccine?

The Leptospirosis vaccine is a particularly controversial one. Unlike viral vaccines (parvovirus, distemper and adenovirus), which have been shown to give immunity for several years and therefore may not need annual boosters, Leptospirosis is a bacterin-based vaccine that gives very poor lengths of immunity. In fact, clinical evidence suggests that bacterin-derived vaccines may not even provide immunity for 12 months, which means that even annual boosters may not give enough protection. Thus the fear of a decrease in vaccination levels leading to the re-emergence of disease is more relevant for bacterial diseases. This is a dilemma facing many dog owners as the time for their annual boosters rolls around. While they can safely leave their viral vaccines unboosted for longer intervals, they may not be able to do this for the bacterin-based vaccines. But should they be boosting for Leptospirosis?

Because it is a zoonotic disease - one that can be transferred to humans - the threat of Leptospirosis cannot be underestimated. However, this does not mean that vaccination is necessarily the answer. Not only is this the vaccine most commonly associated with serious adverse reactions, especially fatal canine anaphylaxis, but it also seems to give poor protection from the disease. If the vaccine were potentially dangerous and not very effective, why would you want to give it to your dog, unless there was a serious threat of exposure to the disease? Just how prevalent is the disease?

Leptospirosis is caused by a bacterium that infects the dog when he comes into contact with the urine of an infected host animal. This can be via the environment (such as contaminated water) or directly from animal to animal. After the bacteria enters the bloodstream, it replicates rapidly in several tissues, such as the kidney, liver and spleen, leading to lethargy, abdominal pain, jaundice, vomiting, bloody diarrhoea, and ultimately liver and kidney damage. The disease can be highly contagious and, in acute cases, rapidly fatal if left untreated. Even if a dog survives the illness, he will remain a carrier of the disease, shedding the bacteria in his urine.

In humans, Leptospirosis is known as Weil's disease and although relatively common in tropical climates, it is rare in Britain and is not included

on the list of Notifiable Diseases at the Department for Environment, Food and Rural Affairs (Defra). In fact, Defra stated that the reason why they do not keep records of Leptospirosis is because it is so rare in humans. According to the Health Protection Agency (HPA), human cases recorded are commonly associated with occupations such as farming (cattle and pigs are strong carriers of Leptospirosis, as well as rodents) and recreational pursuits, such as canoeing, fishing and swimming in lakes and rivers. So although the disease poses a serious threat in being transferable to humans, in reality transmission from dogs to humans rarely happens.

Number crunching

There is debate over whether the disease is common in pet dogs. One of the reasons that Intervet gave for promoting the vaccine was the occurrence of 'outbreaks' across the UK. However, when pressed, Intervet admitted that this claim was not based on epidemiological research but on anecdotal reporting from vets in the field - there is no statistical evidence of outbreaks as such. (In fact, an 'outbreak' is simply defined as an elevation above the normal baseline, even if this is just an increase from 1 dog in a million to 2 dogs in a million - arguably still a very small number and hardly an epidemic as such! And interestingly, Catherine O'Driscoll of the Canine Health Concern has anecdotal evidence that shows the opposite, with many vets - particularly those in rural areas, arguably where dogs have the highest risk of exposure - stating that they had not seen a case of Leptospirosis in over a decade.)

Chris Bradley, Veterinary Adviser to Intervet UK, explained that their anecdotal reports are from government agencies, veterinary schools and veterinary laboratories, which obtain information from post-mortems and referrals. The only way Leptospirosis can be identified is by post-mortem or by blood tests; however, in most cases, due to financial constraints or emotional reluctance, owners refuse post-mortems on deceased pets or choose not to pursue extensive testing. This means that there is a general lack of reporting on the disease and only the occasional anecdotes drift back to Intervet regarding Leptospirosis cases.

But surely, I asked, there would be a record of these anecdotal reports, which when audited, would give some idea of the prevalence of the disease? Even something as simple as "there

were 12 cases in Norwich, and 64 cases in Northampton during the last three months" - without something along these lines, surely you can have no real idea about the incidence of disease and therefore it is slightly irresponsible to be warning about possible epidemics?

Chris Bradley was coy about giving figures, explaining that they are in the process of compiling a database on these reports and saying that it's hard to be definitive about the prevalence of the disease. In fact, the only statistical report he could cite was a 1991 UK serological survey of more than 500 unvaccinated strays in Edinburgh and Glasgow. This study revealed that between 23.5 per cent and 27.5 per cent had antibodies to Leptospirosis (got infected, survived and now carry the disease). Note, though, that these were stray dogs and not pampered pets, with very different lifestyles. It seems to suggest that even in unvaccinated dogs, about 25 per cent would have the disease (although naturally, this does not take into account the percentage of dogs that were infected and subsequently died) - and 75 per cent would have escaped infection. Is this disease really that common after all?

Intervet argues that regardless of how common the disease is, it is important to vaccinate as infection with Leptospirosis can lead to a horrible death for the dog. This would certainly play on most owners' emotions but again, it is really a question of numbers. In the majority of cases, Leptospirosis presents as a chronic, low-grade illness, which may lead to renal failure in old age, but usually the dog recovers to become simply a carrier of the disease. In certain acute cases, the disease will be more aggressive and dogs will suffer a rapid, horrible death. This is certainly something we all want to avoid - but just how common are these acute cases? After all, chicken pox is a disease that can, on rare occasions, lead to severe complications (such as potentially fatal bacteraemia and pneumonia) but this doesn't stop most parents from just letting their children itch their way through an infection. Could the situation not be similar for Leptospirosis? If the disease only causes acute illness and death in a very small percentage of dogs, is it worth vaccinating against it?

Catherine O'Driscoll points out, "If you look at the Edinburgh study, it showed that dogs had antibodies to Leptospirosis, but they didn't have the full-blown disease, and they had survived. This, to me, indicates that most dogs survive Leptospirosis, and in



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most cases, frequently undiagnosed, the dog may have the runs. And then the high acid in the dog's system will neutralise the bacteria. It is my contention that healthy dogs won't be overly threatened by Leptospirosis. Several studies have shown that an organism given adequate and appropriate nutrition will withstand viral and bacterial disease."

It would help if we had some idea of how many dogs would suffer acute Leptospirosis. Again, Intervet was unable to provide any figures and the information does not seem to be available anywhere else. I find it astounding that there is currently not even a rudimentary system to record incidence of Leptospirosis. Surely if this disease is meant to be so deadly to our dogs and so dangerous to humans, there would be some kind of recording system in place? How can pharmaceutical companies fighting something that is supposedly so serious, rely purely on anecdotal reporting? Unfortunately, unless there is a formal reporting scheme for infectious disease in dogs, which provides independent data (free from both pro- and anti-vaccine bias) about the incidence of cases, we will never really know how common a disease Leptospirosis is.

So if we're not sure how prevalent

the disease is, maybe we should vaccinate anyway, just to be safe?

But according to many veterinary experts, the vaccine itself may carry risks. It is the one most likely to trigger serious side effects, especially in puppies and toy breeds, possibly because it has the highest amount of added 'adjuvants' to stimulate the immune system. Some vets in the United States will not give the Leptospirosis vaccine to dogs under 10lb, due to the risk of severe anaphylaxis.

Rare risks

Intervet UK has strongly countered this by referring to the 2004 Animal Health Trust study and saying, "We appreciate that, on rare occasions, vaccination may adversely affect canine health. Our pharmacovigilance monitoring does demonstrate that adverse reactions such as transient malaise, lumps at the site of injection or even anaphylaxis can occur rarely. These rare outcomes however must be weighed up against the risks of the animal not being vaccinated and thus be left vulnerable to disease."

This is cold comfort to someone like Allison who had to put her 12-week-old German Shepherd puppy to sleep, following his Leptospirosis

vaccine. The night Cougar was brought home from his first shots, he started worrying his tail and showing distress. Allison tried to dismiss it as puppy behaviour but her concern turned to panic when Cougar began displaying signs of fear and aggression - first attacking Allison's six-year-old daughter who he had previously adored and then the older dogs in the household, before finally attempting to bite Allison when she tried to comfort him. After consultation with three different vets, Allison was told that Cougar was brain damaged and the only option was to put him to sleep.

"At the point of having Cougar put to sleep, I walked out of the vet's and had to sit on the step as my legs gave way. My husband took me straight to my mother's who gave me brandy, as I was shaking with shock. After all, you don't expect to buy a puppy and then have him put to sleep three weeks later! It totally devastated me. I was offered other puppies but I just couldn't bring myself to have them. It's taken me eight years to get the courage to have another."

Stories like Allison's are heart-wrenching but the vaccine industry would argue that, while tragic, Allison's case is in a negligible minority. Chris Bradley from Intervet insists that he believes their vaccines are safe, with very few adverse reactions recorded to their Nobivac Lepto-2 vaccine, based on their pharmacovigilance monitoring from member vets who are obliged to report any incidences of adverse reactions. Despite the evidence from studies that show a link between vaccines and illnesses like autoimmune haemolytic anaemia, Chris Bradley is sceptical of any real risk from vaccines.

"I don't discount that there are cases of haemolytic anaemia or injection site cancers, but there is no clear evidence that it is definitely caused by the vaccine. For example, with the injection site cancers, the scruff of the neck - where the tumour is detected - is also the place for a lot of other procedures, such as steroid and antibiotic injections and topical flea applications. In an animal that is genetically susceptible, any of these causes could lead to the formation of a tumour - it is not necessarily the vaccine. Yes, there is the odd case that may have a possible link to vaccines but the incidence is so low, it's not considered significant. Our pharmacovigilance database has had no recorded incidence of anaphylactic shock in dogs, from our vaccine and very little record of other reactions.

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Obviously, if certain dogs were particularly susceptible - like certain humans with bee stings - then the vets would warn the client and perhaps recommend a different vaccination schedule. But I firmly believe that, in the majority of cases, the benefits of vaccination far outweigh the risks."

Catherine O'Driscoll, however, has a different perspective. "The 'monitoring' is at present the SARRS [Suspected Adverse Reaction Reporting] scheme. It calls for vets to voluntarily report suspected reactions. The words, 'voluntarily' and 'suspected' are key. Time after time we are contacted by dog owners whose dogs suffered epilepsy, brain damage, skin problems, allergies,

etc, immediately after vaccination, and the vet denies there is any vaccine link. Therefore, no adverse reaction report is filed. If a report is filed, then a committee sticks its finger in the air and makes a subjective decision - and many of the 'experts' at the VMD [Veterinary Medicines Directorate] and the VPC [Veterinary Products Committee] are paid consultants for vaccine companies. Further, vets are not trained in college to look for such reactions. They are only trained to look for anaphylaxis. They are also unaware of latest research. For example, one lady who contacted the Canine Health Concern - her dog had vaccine-site cancer but the vet said it's only seen in cats so must therefore have another cause. Yet in August 2003, the *Journal of Veterinary Medicine* published a report to say that vaccines also cause vaccine-site cancer in dogs!"

But putting the issue of safety aside, what about the effectiveness of the vaccine itself? After all, if it is really good and effective, then it can be argued that it is worth giving, in spite of the risks.

In fact, the vaccine has been heavily criticised, as it appears to give only limited immunity because it does not protect against all the strains of Leptospirosis a dog might meet in the field. Like many bacteria, *Leptospira* exists in hundreds of different strains - called serovars - with two common strains in Britain being *Leptospira canicola* (dog as host) and *Leptospira icterohaemorrhagiae* (rodent as host), as well as two other strains, which use the pig and cattle as host, and many other rarer strains. The current vaccine only contains two serovars (*L. canicola* and *L. icterohaemorrhagiae*), which means that the dog is not protected if it meets any of the other serovars in the field. To someone like Catherine O'Driscoll, this seems crazy - to subject the dog to the high risks of the vaccine but then not give it the full spread of immunity needed.

Intervet insists, however, that anecdotal reports from veterinary laboratories show that *L. icterohaemorrhagiae* and *L. canicola* are still the antibodies most often found in blood tests on infected dogs (although they acknowledge that *L. bratislava* seems to be increasing). Thus they believe that *L. icterohaemorrhagiae* and *L. canicola* are the two strains dogs are most likely to meet and, therefore, the two strains they use in the vaccine. They do admit that they do not have any real epidemiological data regarding the strains dogs are exposed to or infected with. Without proper statistical data,

how can they be so sure dogs are never infected with other strains if they only base their knowledge on anecdotal cases of Leptospirosis? Chris Bradley had already admitted to me earlier that most cases are under-reported and usually only acute cases would merit any owner deciding to have a diagnostic post-mortem or blood tests. Therefore, one could argue that maybe the reason why you only see *L. icterohaemorrhagiae* and *L. canicola* as the most common antibodies is because they are the ones that cause the acute cases.

Stresses and strains

There might be other strains out there, such as *L. bratislava* (which Intervet has admitted is increasing), which are also infecting dogs, but because they cause chronic infection, rather than acute, they are never picked up because those dogs would not be presented for post-mortems or blood tests. But meanwhile, the dogs are still being infected with Leptospirosis, despite being vaccinated, and still running the risk of both getting renal failure in later life and also adverse vaccine reactions. In the United States, neglect to include other strains in the vaccine has led to serious outbreaks across the country from newly emerging serovars, despite dogs being already vaccinated for Leptospirosis with the two old serovars that had been believed to be dominant. Nevertheless, Chris Bradley says that there is little evidence of *L. bratislava* causing clinical disease in dogs; he is confident that the situation in the UK is different from the United States - although it is difficult to see the reason for his confidence when there is no epidemiological data to support it.

The other criticism of the Leptospirosis vaccine is the length of immunity. According to Dr Jean Dodds, a leading veterinarian and expert on canine vaccines, challenge studies from the United States show that immunity only lasts for three to six months, which means that even the recommended annual boosters may leave a dog unprotected for half the year or more.

Intervet claims that its 2003 updated Leptospirosis vaccine, Nobivac Lepto-2, does guarantee immunity for 12 months, based on its own challenge studies, the results of which were published in *Veterinary Microbiology, Vol 95 (2003)*. In this study, only half the test dogs were vaccinated and then all the dogs were 'challenged' with infection from Leptospirosis at five-, 22- and 56-week intervals. The results showed that the vaccinated dogs withstood infection, even after

12 months, and Intervet suggests that immunity may last even longer in some dogs but yearly boosters are the safest upper limit, to cover all dogs.

What is puzzling is how the UK vaccine can give such different immunity levels to the US vaccine? According to Dr Jean Dodds, the core vaccine is the same and even though the American vaccine contains two more serovars than the UK one, "that wouldn't explain the US and UK difference in claims for longevity. Further, it has long been known that the two-way Lepto vaccines last no longer than six months."

Chris Bradley at Intervet claims that the difference lies in the way immunity is assessed - ie, the US is assessing immunity by measuring antibodies to Leptospirosis in the blood. However, dogs can still be immune to the disease, even if they do not show any antibodies - thus the American studies may not record any antibodies after six months, leading them to assume immunity only lasts for six months, when in reality the vaccinated dogs may still be immune. Conversely, the UK vaccine immunity is measured by actually challenging the animals with the disease and seeing if they succumb.

This is nonsense, says Dr Jean Dodds, insisting that the animals in the US are also challenged by the actual disease. Chris Bradley admits that he is unclear about the exact nature of vaccines in the US so he is unable to really explain the difference.

Small sample

Certainly, challenge studies are not infallible - Dr Dodds points out that, "The problem with experimental challenge studies is that only a small number of animals are required to license a new vaccine" - and Chris Bradley admits that the Intervet challenge studies only used 24 dogs but maintains that this was statistically robust and that they did not use more dogs for welfare reasons.

The final issue with the Leptospirosis vaccine is that of 'herd immunity' or lack of, in this case. While the vaccine may protect a dog from the clinical development of the disease, it does not prevent it carrying and shedding the infectious Leptospire into the environment. Thus, this is one vaccine that does not protect the population, only the individual dog. Having said that, Intervet insists that its 2003 updated

vaccine does confer reduced renal shedding and therefore does help towards herd immunity.

This does not impress Catherine O'Driscoll. "Herd immunity refers to the fact that once 67 per cent of a population has been exposed to a disease, then epidemics die out (as with the human plague). As shown in the Edinburgh survey, only around 25 per cent of city dogs had been exposed to Leptospirosis, which shows that herd immunity cannot be claimed at this time. Even so, we still don't have lots of dogs coming down with Lepto and, again, the high acid content of a healthy dog's stomach will put a stop to acute infection."

The American Animal Hospital Association Guidelines for vets places Leptospirosis in their 'non-core' (optional) category, with special mention of its high incidence of post-vaccination reactions and advises that, "Annual boosters are not routinely recommended for all dogs. Vaccination should be restricted to use in areas where a reasonable risk of exposure has been established."

Should we adopt a similar strategy for the UK? No, says Intervet's Chris Bradley, because everywhere in the UK is potentially an area of high risk due to the "booming rodent population", which provides a reservoir for infection. Now, this might be true but it does beg the question that if rats are so numerous and such a dangerous source of disease, why are humans not vaccinated for Leptospirosis? And why - if we are not and not all dogs are vaccinated - are we not all succumbing to the disease, in spite of the high risk of exposure from rats everywhere?

Catherine O'Driscoll says, "Actually, it is said that all of us live within 20ft of rats. They are everywhere, and especially in cities where they live in the sewage network and feast on our rubbish. The rats aren't vaccinated, of course, but the human population is NOT beset and besieged by a Leptospirosis epidemic. How many people are vaccinated against Leptospirosis, despite all these rats? Are farm workers vaccinated against Lepto - where it seems the greatest threat lies?"

It would be safe to assume that if the United States - arguably equally overrun with rats - can define geographical areas of high risk for Leptospirosis, then the UK should be able to do the same. After all, it seems - from Defra and HPA [Health

Protection Agency] information on the disease - that even though there are rats everywhere, the risk for humans is only high for people who work with farm animals, who spend large amounts of time in possibly contaminated bodies of water and in areas of flooding. So the situation should be similar for dogs, shouldn't it? At the very least, not all dogs could have the same risk of exposure and there is some argument for only vaccinating the dogs in high-risk areas.

No change

Despite conflicting evidence, annual boosting for Leptospirosis remains the recommendation in the UK and something most vets will push for, as they have little support from the veterinary community if they opt not to vaccinate and the dog subsequently becomes ill. In spite of support from scientific research, it seems that most vets still feel obliged to adhere to the vaccine data sheet recommendations. Liz Jay was one such owner who came to bitterly regret her vet's advice to repeat the Leptospirosis vaccine on her Bearded Collie, Lulu. Following her booster, Lulu developed extremely itchy, peeling skin while her hair fell out in clumps until she was about two-thirds bald. She also developed a series of minor infections - ears, eyes, anal glands, nails - and occasional bouts of seizures and vomiting. Things came to a head when Lulu collapsed at a show, bleeding internally, and was diagnosed with haemangiosarcoma, with tumours from her ovaries to her heart. Liz couldn't even wake her up to say goodbye.

So it seems that we are back at square one, with the vaccine companies saying that there is a real need for protection and that the Leptospirosis vaccine is a good product that carries negligible risk. Meanwhile, the sceptics, like Catherine O'Driscoll, cynically believe in more financial motives, saying, "The fact that it is dangerous and practically useless, and fighting a disease that is barely a problem, doesn't much matter to them."

Perhaps the best we can hope for is informed consent: make sure your vet explains the dangers of the vaccine to you; find out about the length and coverage of immunity of the vaccine he is using; ask him about the real risk of Leptospirosis in your area; and weigh up the risk benefit ratio before you subject your dog to 'just a little prick'. ::

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WANT TO KNOW MORE?

Log on to www.dogstodaymagazine.co.uk for more about the risks associated with vaccination and calls for a change to the recommended vaccine protocol