

## **Encephalitozoon Cuniculi**

*E. cuniculi* has been one of the hottest topics in rabbit health over the past few years. It's also one of the most controversial! Many experts are convinced that *E. cuniculi* is a major rabbit health issue, responsible for a whole host of rabbit health problems. However, this opinion is not universal: some vets think this parasite rarely causes serious trouble. We now know that *E. cuniculi* infection is very common in apparently healthy pet rabbits (see later in this article) therefore the belief that *E. cuniculi* can cause serious problems, but only in a minority of infected rabbits, is likely to become more popular again.

Although a certain amount is known about the parasite itself, most information regarding *E. cuniculi* problems in companion rabbits is anecdotal and therefore open to debate. It was as recently as 2001 that the first firm evidence was published to support the treatment of this condition in rabbits using anti-parasitic drugs. So where do we draw the line between hype and real bunny health problems?

### **What is *E. cuniculi*?**

It's a parasite - a small protozoan that lives inside the body cells of its host. It doesn't just infect rabbits: many other mammals (including humans in some special circumstances), and even birds can be infected.

### **Does *E. cuniculi* occur in Britain?**

Yes, it does, and we now know it is widespread in the UK.

A recent major research project run by Emma Keeble at Edinburgh Vet School (and supported financially by the Rabbit Welfare Fund) set out to determine what percentage of 'healthy' British pet rabbits that have exposed to *E. cuniculi*.

At the time of writing (late 2004) the full results of the study are being prepared for publication. However, Emma's study found that just over 50% of apparently healthy rabbits had been exposed to *E. cuniculi* infection.

A small sample, frequently quoted sample, performed by Frances Harcourt Brown a few years ago, showed that 8 of 30 rabbits in her Yorkshire practice showing serological evidence of exposure to *E. cuniculi*. However, Frances later felt that in hindsight some of these animals had very subtle neurological signs and may not have been the "healthy" sample she had intended. This illustrates the difficulties vets face in trying to find an accurate figure for prevalence of exposure/infection in healthy animals.

### **How do rabbits get infected with *E. cuniculi*?**

It is likely that the majority of rabbits are infected at a very early age from their mother. The route of infection is orally via ingestion of urine contaminated by *E. cuniculi* spores. One month after infection, a rabbit will start to

shed spores in its urine. Shedding of spores continues for up to three months and possibly on and off for life. The spores are tough little things and remain in the environment for more than a month.

There's not much you can do to avoid obtaining a rabbit with *E. cuniculi*. If you are determined, you could consider having any potential new bunny blood tested before adoption.

In the long term, it might be possible to reduce the percentage of infected rabbits - either by treating breeding rabbits with drugs to kill off *E. cuniculi*, or by weaning baby rabbits very early, to prevent them being infected by their mother. However, proper studies would be needed to address these options, and weigh up their effectiveness as well as the risk and benefits to the rabbits.

### **What happens when a rabbit becomes infected?**

When a rabbit is first infected, the parasite is absorbed from the intestines. Once inside the body, it heads off to other organs, especially the kidneys and brain, where it causes lesions called "granulomas". These can be found in the kidneys of rabbits only a few months old. Granulomas may develop in other parts of the body, such as the liver, as well as in the brain.

It all sounds very drastic, but at the current time, consensus opinion would seem to be that the majority of infected rabbits probably go through life quite happily without experiencing any problems from their *E. cuniculi* infection and associated granulomas. However, please note the word "consensus" - some vets do believe that most (if not all) *E. cuniculi* infected rabbits will encounter problems as they grow older. Although this is a minority view, we won't know for definite unless a study is performed to monitor a cohort of apparently healthy rabbits - already known to have been exposed to *E. cuniculi* - throughout their lives.

Now that awareness of *E. cuniculi* is rising on both sides of the Atlantic - and labs processing the blood samples from pet bunnies are starting to include *E. cuniculi* serology in their routine blood testing panels - it is hopeful that we will gain a much better picture of the next few years.

### **What kind of problems can *E. cuniculi* cause?**

As mentioned above, although it is thought by most experts that the majority of rabbits infected with *E. cuniculi* remain well, a small percentage of bunnies are not so lucky.

Renal (kidney) granulomas are usually harmless, although a few rabbits develop mild chronic renal failure with problems such as increasing thirst and weight loss. It's the lesions in the brain that tend to cause problems. The range of possible neurological presentations is immense but some examples are:

- convulsions (fits)
- tremors
- torticollis (head tilt)
- hind limb weakness (ataxia)
- coma
- urinary incontinence (caused by the central nervous system lesions, not those in the kidney).
- Loss of balance

E. cuniculi can also affect the eyes. If unborn baby rabbits become infected via the placenta, granulomas may develop around the lens and

cause problems after birth. Affected rabbits sometimes have white patches visible in the eye.

One of difficulties in trying to decide whether *E. cuniculi* is the cause of any specific problem is that every one of these neurological problems has other possible (and common) causes.

For example, head tilt is often caused by bacterial infections such as *Pasteurella multocida*, but can be caused by a multitude of other problems. Some texts suggest that head tilt in dwarf breeds is more likely to be caused by *E. cuniculi* and in larger breeds by *Pasteurella* although this is also controversial. But both infections are so common it may be impossible to differentiate which (if either) is the cause of head tilt in any particular rabbit. And some bunnies may have both!

### **How would I know if my bunny has *E. cuniculi*?**

Antibodies to *E. cuniculi* can be detected on a blood test. Hence, a rabbit that has been infected to *E. cuniculi* will produce antibodies that will produce a positive test. However, some rabbits appear to clear the infection completely and over time their blood test will become negative again.

Until very recently, the tests available in the UK could not distinguish between current and past infection. A negative result basically ruled out *E. cuniculi* as the cause of the illness but a positive result only told you that the bunny had been infected at some point in time, and did not help to determine whether the infection was recent and ongoing.

However, quantitative tests, which can actually measure the levels of antibody in the blood sample (not just whether they are there or not) recently became available in the UK, introduced by Medlab in Cheshire. By testing two separate samples (taken with an interval between them) it is now possible to determine if a rabbit is mounting an immune response to an active *E. cuniculi* infection.

If your rabbit develops a problem that may be due to *E. cuniculi* then your vet may suggest blood testing. If the rabbit tests positive, it's probably worth adding treatment for *E. cuniculi* to see if it improves the situation.

### **Is there any treatment for *E. cuniculi*?**

Yes and no!

The first hurdle, alluded to above, is determining whether or not *E. cuniculi* is the cause of any particular problem. It is usually impossible to be certain, unless a post mortem examination is performed if the rabbit should die. Even if *E. cuniculi* seems the likely culprit, anecdotal reports suggest that some cases improve without treatment.

Treating rabbits with drugs to kill off *E. cuniculi* is a much more recent development. For several years, rabbit vets both here and in the USA claimed good results with drugs such as albendazole and fenbendazole, which are used as worming treatments in other species. It should be noted they are not currently licensed for use in rabbits in the UK.

A landmark study published in the *Veterinary Record* in April 2001([see reference](#)) offered perhaps the first evidence that treatment of *E. cuniculi* with fenbendazole (Panacur) in rabbits really does work - and has led to a more pro-active approach in treating this problem in rabbits. This study considered the use of fenbendazole (at a dose of 20 mg/kg body weight daily for 28 days) for preventing an experimental infection of *E. cuniculi* in rabbits. Fenbendazole given prior to exposure to the parasite successfully prevented infection, and this may be a way of controlling infection in colonies/groups of rabbits where some animals have the disease and others aren't yet infected.

The second part of the same paper looked at rabbits with naturally acquired *E. cuniculi* infection. Following treatment with fenbendazole, *E. cuniculi* parasites were no longer present (detectable). The authors of the paper went on to suggest that in order to improve the treatment of *E. cuniculi* in rabbits, the combination of fenbendazole and glucocorticoids (steroids) could be valuable and should be examined in a controlled study.

There's a catch, though. Although the parasite may be killed by drugs such as fenbendazole, the bunny may not actually get any better. This is because the brain inflammation associated with the parasite may have already caused irreversible damage. This is why steroid treatment has been suggested, in an effort to damp down this inflammatory response. Opponents point out that "damping down" the immune system with steroids could allow the underlying parasitic infection to get worse. Hence, it is probably safest to use steroids only in conjunction with fenbendazole and not as sole therapy, until more evidence is available.

*E. cuniculi* infection is (probably) so common that some vets feel that there may be a case for treating all rabbits just in case they are infected. Others argue that such a small percentage of infected rabbits go on to develop problems, that there is no need to treat unless problems actually show up, even if they are known to have been exposed to *E. cuniculi*. Be guided by your rabbit-friendly vet, but appreciate that the whole issue is fraught with controversy and opinions are changing rapidly.

### **Is there any risk to human health?**

Only if you are severely immunocompromised. For example, there are reports of people with AIDS suffering from *E. cuniculi* infection. People with normal immune systems don't need to worry. If you have a medical condition that makes you severely immunocompromised, it might be worth having your bunny blood tested and having him treated if he tests positive. Consider asking your immunologist to talk to your vet.

### **If one of a bonded pair of rabbits has died from *E. cuniculi* should the survivor be treated?**

This is another controversial question...different vets give different answers, depending on their personal beliefs. Vets who believe that the majority of infected rabbits go through life without any problems tend not to recommend routine treatment of the survivor, unless goes in to develop problems that may be caused by *E. cuniculi*. However, other vets do recommend treating the survivor, especially since the publication of the Vet Record paper in April 2001, which implied that treatment of survivors may be beneficial.

If you keep rabbits in a colony setting, it's probably sensible to raise food off the floor, which will reduce the risk of food becoming contaminated with urine and hence *E. cuniculi* spores. You may also want to think about blood testing all the rabbits in the group and keeping *E. cuniculi* negative rabbits separate from those who test positive.

### **What's the upshot?**

Although knowledge about *E. cuniculi* is increasing, there are still more questions than answers when it comes to *E. cuniculi*. However, now we know that so many apparently healthy rabbits are infected, it is quite

possible that this disease is actually less of a problem than we had feared, and that most infected rabbits end up as asymptomatic carriers.

Rabbit owners do need to be aware of the problem, but should try not to get too paranoid. Hopefully over the next few years, more definite recommendations will emerge.

In the meantime, if your bunny should fall sick with what might be an *E. cuniculi* related problem, do have him blood tested - bear in mind that with the new quantitative tests, your vet may recommend two tests taken a few weeks apart. If he tests positive, your vet will probably want to try treatment with fenbendazole and perhaps steroids.

If you should suffer the sadness of losing a rabbit under these circumstances, please consider having a post mortem examination performed, so we take more steps in the quest to unravel exactly what impact this parasite may be having on the welfare of all our rabbits.

### **References and Further Reading**

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### **Acknowledgements & Revision History**

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