

Encephalitozoon Cuniculi What the?

I've been doing some research into E Cuniculi, which I suspect might be behind some of our rabbit's health problems. One of the reasons, which instigated my curiosity, was breeders increasingly reporting that they were having problems with 'faders'. This particular term applies to kits that initially appear healthy but at some stage of their development don't thrive or survive.



I thought this was a bit strange, as for over twenty years having been actively involved in the rabbit fancy, I don't remember breeders worrying about kitten's 'fading'. Oh sure there were unexplained deaths, though you could pretty well figure out the reason behind some mortalities from their symptoms or confirmed post mortems.

In the 'olden days' kittens that didn't thrive would generally be treated for coccidiosis. Interestingly, there are similar clinical symptoms between coccidiosis and E Cuniculi, as they both involve protozoa parasites – but there are differences. Transference of contamination is distinctive with Cocci via infected droppings and EC via urine. Medications are also quite different, as with EC you would use a product containing 'fenbendazole' while with the other would treat with a sulphur based coccidiostat.

As a comparison coccidia symptoms are stunted growth, poor weight gain, overall poor condition, distended stomach, diarrhea or constipation, dull rough coat, increased thirst, anaemia and depression. There are quite a number of symptoms attributed to rabbits infected with E Cuniculi

- torticollis (head tilt/wry neck) – other causes of head tilt and neurological problems in rabbits should also be ruled out, such as spinal trauma, inherited congenital abnormalities, toxicity (e.g. lead), bacterial or viral infections such as abscesses, listeria, toxoplasma or middle ear infection.
- darting eye
- unsteadiness/lack of balance and or rolling on it's side
- epileptic type fits/convulsions
- excessive urination and or urinary incontinence
- hind limb weakness or paralysis
- weight loss and or loss of appetite
- kidney disease/renal failure
- kits infected invitro via the placenta may develop lesions around the eyes and or visible white spots on the eye.

If E Cuniculi has only occurred in the last few years, it makes you wonder how it initially arrived. I suspect it could have been introduced by imported rabbits. This is purely conjecture – but given that, New Zealanders treat their bunnies for E Cuniculi, you would conclude that there must be a justifiable reason for doing so . . . ?

One of the frustrating things about trying to gather information about EC was the lack of categorical facts or proven studies – instead most of what I could source were 'expert's' theories. For this reason, I've done my best to supply what the majority seem to agree upon.

What is E Cuniculi and what does it do?

Encephalitozoon cuniculi (EC) is a single cell, protozoa parasite that primarily lives in a rabbit's kidneys and migrates via the blood to other organs such as the brain, spinal cord or liver and then causes cysts/lesions called 'granulomas'. Once inside the host cell the parasite multiplies causing the cell to enlarge and eventually ruptures, releasing spores. These in turn infect nearby cells and pass into the blood to other organs. The life cycle lasts between three to five weeks and when the host cell ruptures it causes inflammation and results in clinical signs/symptoms.

Rabbits do not always show signs of infection until perhaps another illness, stress or dehydration triggers the disease. In the meantime, these carriers may infect other rabbits when they ingest something that was in contact with contaminated urine. Infection can also occur across the placenta during pregnancy from mother to kits before they are born.

After the rabbit is infected, it takes about a month from infection to excrete spores in their urine. Spores continue to shed for 3 months, but can also be shed throughout their life.

When it reproduces in the kidneys, it can destroy cells and permanently damage kidney tissue. Symptoms of this is the rabbit displays an increased thirst and urination, weight loss or at worst kidney failure and death. After multiplying in the kidney, the spores travel through the body via the blood. When the organism reaches the brain, it forms cysts that can rupture cells resulting in rabbits exhibiting hind limb paralysis, tremors or head tilt/wry neck. Much depends on where the cysts have developed in the brain, to consequently affect whatever part of the body that the brain controls.

E cuniculi is difficult to diagnose and successive blood testing is the only way to identify the condition. However because it is a protozoon, the organism is often not detectable in either live rabbits or during a post mortem examinations.

Antibodies to EC can be detected through a blood test called a titer test. A rabbit exposed to EC in its lifetime will produce antibodies as a result of the exposure. A titer test is used to detect the level of the antibody to the organism in the blood. A single positive antibody result tells you that during some time during its life that the rabbit has been exposed but does not prove or differentiate between a simple exposure, an active infection or signify what will happen. There could be any one of three scenarios in this case; the rabbit could just have become infected prior to the development of clinical signs, could be chronically infected, with no clinical signs or could have been previously infected and then recovered. By doing two titer tests (with an interval of about four weeks time in between) and comparing the results, it is possible to determine if the rabbit is producing an immune response to an active infection or if he was previously infected.

Even with a rising titer result, it can't be categorically determined if a particular health problem was caused by EC or something else. Head tilt, for example, has many causes other than EC, including bacterial or viral infections, trauma and toxicity. A false negative titer may also result if an infected animal produces an inadequate amount of antibodies.

Treatment

NZ breeders use a product called 'Valberzine', UK has 'Panacur Rabbit' and 'Lapizole', in OZ, however 'Panacur 25' is supposed to be a good all rounder for parasites. Panacur 25 (a broad-spectrum wormer for sheep, goats etc) contains the same ingredient 'fenbendazole' mentioned in overseas products. Lapizone dosage is 0.5 ml per 0.5 kg bodyweight; this is equivalent to 20 mg fenbendazole per kg bodyweight – this particular drug is reported to be the only one that has been studied and believed to cure the infection, rather than just control it

Here's a link recommending 'Panacur Rabbit' dosage of 20 mg per kilogram for 28 days to rabbits with clinical signs or for 9 days as a preventative:
http://www.intervet.co.uk/Products_Public/Panacur_Rabbit/090_Product_Datasheet.asp

Since the spores are excreted in the urine, they become a source of infection and survive for weeks in the environment. To prevent re-infection during treatment, owners should practice quarantine and regularly disinfect hutches, food bowls etc. Spores can survive in the environment in average temperatures and dry conditions for around four weeks, though fortunately easily killed by common disinfectants.

Interesting statements collected from various sources

- Some experts are of the opinion that the majority of rabbits who have been exposed to EC do not suffer any health consequences. Others believe that EC is responsible for numerous health problems. *(Well, that sure is contradictory and confusing!)*
- There are an estimated 1.3–3 million pet rabbits in the UK: Over fifty percent of these are likely to have been exposed to Encephalitozoon cuniculi parasite. *(If EC is so hard to detect, then how on earth could anyone come up with this percentage?)*
- Even today, EC is still not well understood in the rabbit community. Theories and opinions regarding transmission, treatment and the severity of the problems caused by this parasite vary widely. To date, none of the theories have really been proven or not proven by a definitive study.
- The rabbit can be absolutely fine one day, the next it can have serious symptoms. The problem has a sudden onset, and can kill very rapidly. It also seems that animals with less body density (e.g. small rabbits and vulnerable weanlings), are the most susceptible, but it appears animals of any age can develop symptoms.

- Encephalitozoon cuniculi is an emerging disease in pet rabbits, although the infection has been recognised for some time in farm and laboratory rabbits.
- The first mammalian infections were described in rabbits in the 1920's (Wright and Craighead, 1922) and the infection was recognised in humans in the 1950's, with increasing reports during the 1980's. It is potentially zoonotic (can spread to humans) and has been associated with infections in immunocompromised people. *(Bet you didn't want to know about that – no need to get paranoid on us!)*
- E cuniculi may also be found in other mammal species, including rodents, guinea pigs, foxes, monkeys, cats, dogs, sheep, goats, pigs, llamas and snakes (Shadduck and others, 1979, Pang and Shadduck, 1985, Illanes and others, 1993, Lobo and others, 2003). *(Okay, so no more 'snakes in the grass' or getting up to any 'monkey business!')*
- Recent research has indicated that they may be more closely related to fungi than to protozoa (Wasson and Peper, 2000).
- Inhalation of spores has been shown to cause infection, although these last two routes are thought to occur less frequently (Cox and others, 1979).
- Infection has been diagnosed in rabbits in Europe, Africa, America and Australia. *(Says who? They didn't validate how they came to this conclusion)*
- A major problem with this disease is the difficulty diagnosing an active infection in live rabbits. Post mortem is often the only definite way of testing for this parasite, with typical lesions seen in stained slide sections of the kidney and/or brain on microscopic examination. Some texts state that the organism may not be found, even on post mortem examination, despite classic clinical signs and changes on histopathology (Percy and Barthold, 1993). This makes absolute diagnosis difficult and questions whether this parasite is truly involved in these cases.

Still a bit confused about E Cuniculi? Yes, well I don't blame you – because so am I!

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