

Target canine 'superspreaders' to halt killer disease and cull fewer dogs, study suggests

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A new way to test for the parasite which causes the fatal disease leishmaniasis could help control its spread to humans and stop dogs being needlessly killed in parts of South America.

Zoonotic visceral [leishmaniasis](#) is a vector-transmitted parasitic infection which can be fatal if left untreated. It generally affects the poorest of the poor, particularly malnourished children in developing countries, with an estimated 200,000 to 400,000 new cases in humans annually according to World Health Organisation figures.

Dogs have been shown to be the 'reservoir' for the parasite, which is transmitted to humans via bites from female sandflies that have fed on blood from infected dogs.

In Brazil tens of thousands of dogs that test positive for anti-Leishmania antibodies are killed every year in an effort to control the disease. However the presence of antibodies does not necessarily mean that the dog is symptomatic or is infectious to sandflies so that it can pass the parasite onto humans.

This means that it is likely many dogs are culled unnecessarily, which usually results in [dog owners](#) acquiring a new dog - often a puppy that has not encountered the parasite before and that is then likely to become infected, thus helping to drive transmission.

Previous studies have questioned the effectiveness of these measures in

controlling leishmaniasis in dogs and humans and the policy is also undermined by significant levels of non-compliance among dog owners.

An alternative approach is outlined in a new study by scientists at the University of Warwick who have shown that parasite load – a count of the number of parasites present in a dog's skin tissue – is related to its infectiousness to sandflies.

Their long-term study of dogs in the Brazilian Amazon indicates that a small number of 'superspreader' dogs are responsible for the majority of the spread of the parasite.

They found that about ten per cent of dogs are host to 90 per cent of the [parasites](#) potentially available to sandflies identified in the study population and that these superspreader dogs are responsible for the majority (more than 80 per cent) of all transmission events to sandflies.

The study also looked at crab-eating foxes living in the same area and found that they had parasite numbers comparable to those of non-infectious dogs - a finding that backs up the evidence of previous studies by the Warwick researchers that these foxes are not likely to play a significant role in the spread of the disease.

Dr Orin Courtenay of the School of Life Sciences at the University of Warwick led the study. He said: "The current control of [visceral leishmaniasis](#) in Brazil includes killing dogs on a large scale and at great cost. This doesn't appear to have a significant effect on either canine or human infection rates and, not surprisingly, this strategy has been called into question on scientific, logistic and ethical grounds by both the Brazilian and international communities.

"Our study suggests an alternative approach - targeting control at these highly infectious and often the sickest dogs. This approach could be

more cost-effective in controlling the spread of this devastating disease in humans than the current policy.

"Instead of canine testing for presence or absence of anti-Leishmania antibodies, we suggest testing directly for parasite loads in the skin of the dog where sandflies like to bite, or to alter the current antibody test to threshold levels reflecting superspreader status.

"This way you can identify dogs most likely to be highly infectious to sandflies – it is these dogs that pose the biggest threat to human health.

"Targeting control measures on these 'superspreaders' - the small fraction of dogs which are responsible for the majority of transmission - should not only be a far more effective way to control the spread of the parasite, it would also result in fewer dogs being killed.

"We now hope to take our research to the next stage, which is to trial these threshold-based tests to see what effect that may have on controlling the spread of leishmaniasis."

The longitudinal study, led by the University of Warwick, was published in the journal *PLOS Neglected Tropical Diseases*.

The team are now carrying out a similar study on the role of rodents and [dogs](#) in the transmission of a disfiguring mucocutaneous form of leishmaniasis, working with the Fundação Oswaldo Cruz (Fiocruz) in Brazil, thanks to a link forged through a Science Without Borders grant.

More information: www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal

Provided by University of Warwick

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