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Controlling bovine tuberculosis: a One Health challenge

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Control of bTB remains a difficult problem in many countries, particularly where 'test-and-slaughter' policies cannot be implemented or where wildlife reservoirs of Mycobacterium bovis serve as a recurrent source of infection for domestic livestock. Alternative control measures are urgently required and vaccination is a promising option.

The use of BCG vaccine in animals has been limited

Although the *M. bovis* bacille Calmette–Guérin (BCG) vaccine has been used in humans for nearly a century, its use in animals has been limited, principally because protection against tuberculosis has been incomplete and vaccination may result in animals reacting in the tuberculin skin test. However, in the past 25 years, the protection induced by BCG vaccine in animals has been optimised and tests to differentiate infected from vaccinated animals (DIVA) have been developed.

BCG vaccination can moderate the severity of the disease in domestic livestock

Experimental challenge studies in domestic livestock, including cattle, goats and farmed deer, have demonstrated that BCG vaccination can moderate the severity of the disease, while field trials in cattle and goats have indicated that vaccination can also reduce infection. No single vaccine has been shown to be better than BCG in cattle, although combinations of BCG with various subunit tuberculosis vaccines have produced encouraging results and could be applied in the future [1, 2]. Vaccination of cattle with BCG would have greatest application in countries where 'test-and-slaughter' strategies are not affordable or socially acceptable and, in this situation, BCG could play a role in reducing the spread of bTB. Alternatively, vaccination could be integrated with 'test-and-slaughter' control measures, where DIVA tests are used for bTB diagnosis, particularly skin tests utilising specific *M. bovis* antigens [3].

The experimental use of BCG vaccine in wildlife is showing promise

The field testing of BCG vaccine, administered via oral or parenteral routes, in possums and badgers has resulted in significant reductions in the infection of these animals, and a parenteral BCG vaccine has now been licensed for use in badgers in the United Kingdom [4, 5]. In wild boar, feral deer and ferrets, BCG vaccine has been shown to induce significant levels of protection against experimental challenge with bTB, and practical systems for the delivery of oral bait bTB vaccines to wildlife have now been established [2].

In summary, studies in recent years have markedly improved our understanding of the factors influencing BCG vaccine efficacy and, in future, vaccination should be a valuable control measure for bTB in domestic livestock and wild animals.

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DOSSIER

Efficacy of BCG vaccine for the control of tuberculosis in domestic livestock and wildlife

SUMMARY

Bovine tuberculosis is an intractable problem where 'test-and-cull' policies are not affordable or socially acceptable, or where *Mycobacterium bovis* infection is sustained by wildlife reservoirs. Recent studies in domestic livestock and wildlife have demonstrated that vaccination with BCG could be a valuable control measure, particularly when integrated with other strategies.

KEYWORDS

#BCG vaccine, #cattle, #deer, #goat, #bovine tuberculosis, #vaccination, #wildlife.

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