

Badger Vaccination

Badgers can act as a wildlife reservoir for *Mycobacterium bovis*, the bacterium which causes tuberculosis (TB) in cattle. Badger vaccination aims to reduce the transmission and spread of the disease in the badger population with the intention of reducing the risk of cattle contracting TB.

How are badgers vaccinated?

- Traps are deployed near signs of badger activity (setts, runs or latrines).
- Traps are usually locked open and pre-baited with peanuts (typically for 7-10 days).
- Traps are set to capture for two consecutive nights.
- Traps are checked in the early morning and captured badgers are vaccinated with BCG (the same vaccine used in humans), temporarily marked and released.



How often does vaccination take place?

Trapping for vaccination (as described above) takes place once per year at each sett or target area, typically for four years. It is unclear how long the vaccine is effective in individual badgers. Annual vaccination will result in some animals being vaccinated several times, but also aims to maintain and increase vaccine coverage by vaccinating new cubs or immigrants into the population.

What effect does the vaccine have on badgers?

The effects of badger vaccination by injection have been evaluated in several captive experimental studies ^[1,2] and during a four year field study in Gloucestershire ^[2,3]. Although vaccination with BCG will not guarantee protection from infection, meaning some badgers may still become infected, these studies provide good evidence for the following beneficial effects:



- **Vaccination reduces the likelihood of badgers developing lesions or excreting TB bacteria ^[1,2].**
- **Vaccination reduces the rate of new infections (measured using diagnostic tests) in badgers by 76% ^[3].**
- **Vaccinating more than 1/3 of adults in a badger social group reduces new infections (measured using diagnostic tests) in unvaccinated badger cubs by 79% ^[3].**

Will the vaccine work on badgers already infected with TB?

There is no evidence that vaccination will have either a positive or negative effect on badgers that are already infected with TB. Even if vaccination has no effect on infected badgers this does not mean that it cannot reduce TB in badger populations. Badgers typically live for 3-5 years. Over a four year programme, vaccination should reduce new cases of TB in badgers (as in the Gloucestershire field trial) and infected animals will gradually die off. The combination of these processes should lead to a reduction in the number of infected badgers in an area.

Is the vaccine safe?

BCG is a live vaccine, but studies have shown that the risk of vaccinated badgers shedding BCG into the environment is minimal [4]. Vaccination does not lead to changes in badger ranging behaviour or 'perturbation' [5], and there is no evidence of negative effects on badger health or welfare [4].



Does badger vaccination reduce TB in cattle?

Rates of TB in cattle can be effected by many factors (including wildlife) and studies to measure the impact of vaccination (or any other control strategies) ideally require data from large numbers of farms, combined with complex statistical analyses. Unfortunately, the fairly modest scale of badger vaccination projects to date in the UK means that we do not know for sure what effect badger vaccination has on cattle TB incidence. The proven beneficial effects of the BCG vaccine on badgers [1,2,3] suggest that vaccination will reduce TB in badger populations. Logically fewer infected badgers would have a beneficial effect on TB in cattle. Modelling studies also predict that badger vaccination will reduce TB in both badgers and cattle [6]. In the Republic of Ireland, large scale badger vaccination has been conducted for a number of years in areas which were previously culled. Analyses has shown that TB incidence rates in cattle were similar in vaccination areas compared to areas which continued with badger culling, suggesting that vaccination was not inferior to culling as a means of disease control in these areas [7]. As badger vaccination is carried out in more areas in the UK this will provide an opportunity for the effects on TB in cattle to be better understood.



Who can vaccinate badgers?

In England, trapping and vaccinating badgers requires a licence from Natural England/Defra, along with permission from the farmer or land owner. The vaccine has to be administered by either a vet or a certified lay-vaccinator. In order to be certified, lay-vaccinators have to be deemed competent after attending a training course run by APHA or approved trainers. The training course for lay vaccinators in England is approved by the Secretary of State (after consultation with the Royal College of Veterinary Surgeons).

Where can I find out more information?

More information on bovine TB and a range of related topics can be found on www.tbhub.co.uk. Information on the 'Badger Edge Vaccination Scheme' can be found on www.gov.uk. This sheet was produced as part of a Knowledge Exchange project funded by NERC.

Studies referenced

1. **Lesellier et al. (2011)** Protection of Eurasian badgers (*Meles meles*) from tuberculosis after intra-muscular vaccination with different doses of BCG. *Vaccine*
2. **Chambers et al. (2011)** Bacillus Calmette-Guérin vaccination reduces the severity and progression of tuberculosis in badgers. *Proceedings of the Royal Society of London B*
3. **Carter et al. (2012)** BCG Vaccination Reduces Risk of Tuberculosis Infection in Vaccinated Badgers and Unvaccinated Badger Cubs. *PLoS one*
4. **Lesellier et al. (2006)** The safety and immunogenicity of Bacillus Calmette-Guérin (BCG) vaccine in European badgers (*Meles meles*). *Veterinary Immunology and Immunopathology*
5. **Woodroffe et al. (2017)** Ranging behaviour of badgers *Meles meles* vaccinated with Bacillus Calmette Guerin. *Journal of Applied Ecology*.
6. **Smith et al. (2012)** Comparing badger (*Meles meles*) management strategies for reducing tuberculosis incidence in cattle. **PLoS ONE**
7. **Martin et al. (2020)** Is moving from targeted culling to BCG-vaccination of badgers (*Meles meles*) associated with an unacceptable increased incidence of cattle herd tuberculosis in the Republic of Ireland? A practical non-inferiority wildlife intervention study in the Republic of Ireland (2011-2017). *Preventive veterinary medicine*