



STAR-IDAZ
International Research
Consortium on Animal Health

**Executive summary of
priority research needs
Bovine tuberculosis
May 2024**



**Funded by
the European Union**

Research Priorities for bovine tuberculosis

STAR-IDAZ International Research Consortium (IRC) has developed roadmaps on bovine tuberculosis to highlight areas where targeted research efforts can speed up the delivery of improved control methods of this important zoonosis.

Working groups of international experts developed research roadmap for (1) Diagnostic tests, (2) Vaccine development, and (3) Control strategies, and identified the priority research gaps, shown in Table 1.

STAR-IDAZ IRC and bovine tuberculosis

STAR-IDAZ (IRC) is a global initiative to address the coordination of research programmes at an international level in the area of animal health and in particular infectious animal diseases including zoonoses (STAR-IDAZ – Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses) – for details see <http://www.star-idaz.net/>.

Research on bovine tuberculosis (bTB) is a critical focus for the STAR-IDAZ IRC. The economic impact of bTB is profound, significantly affecting the cattle industries and complicating livestock management across affected regions worldwide. The causative agent, *Mycobacterium bovis*, not only affects cattle but also has a wide host range including wildlife, with human cases, highlighting its zoonotic potential. Therefore, targeted research is essential to develop accurate diagnostic tests, effective vaccines that facilitate differentiation between infected and vaccinated animals (DIVA), and to understand the epidemiology of bTB to improve control strategies and mitigate zoonotic risks.

Table 1: Main research priorities identified for bovine tuberculosis

Topics	Research priorities
Diagnostic tests	<ul style="list-style-type: none"> • Develop sensitive, specific, rapid, and easy-to-use pen-side tests for direct detection of bTB in animals and animal products. • Develop diagnostics that differentiate between infected and vaccinated animals (DIVA). • Create tests suitable for both wildlife and farmed animals for active surveillance. • Focus on single-shot, same-day tests for immediate decision-making. • Adapt tests for both post-mortem surveillance and ante-mortem testing in various regions, including Low- and Middle-Income Countries (LMICs). • Develop biosignatures based on biomarkers to inform on the latent/carrier status of animals and assess the risk of <i>M. bovis</i> shedding and transmission. • Characterize the immune response to identify specific antigens that animals respond to at different infection stages. • Create tools to identify animals at risk of transmitting bTB for targeted management strategies to reduce the need for large-scale culling. • Use whole-genome sequencing of <i>M. bovis</i> to identify antigens with diagnostic potential and develop tests that detect pathogen genomes as markers of infection.
Vaccine development	<ul style="list-style-type: none"> • Develop vaccines that reduce R_0 to <1 and allow differentiation between vaccinated and infected cattle. • Validate the efficacy of BCG for immediate deployment and as a baseline for future vaccines. • Advance development of attenuated, DNA, RNA, and subunit vaccines that support differentiation from natural infection. • Optimize vaccines to enhance immune response without affecting diagnostic tests. • Rationally attenuate <i>M. bovis</i> to create vaccines that protect without causing disease. • Investigate broad health benefits (trained immunity) of new vaccines. • Study how <i>M. bovis</i> alters host immune response to develop targeted interventions.

	<ul style="list-style-type: none"> • Generate effective immune responses from advanced vaccine candidates. • Identify and eliminate pathological change-causing factors in vaccine development. • Remove factors from vaccines that cause false positives in skin tests. • Enhance understanding of host mechanisms for clearing or controlling bTB infection.
<p>Control strategies</p>	<ul style="list-style-type: none"> • Develop mathematical models to understand risk factors and predict disease trends. • Prevent the introduction and spread of bTB within herds and to wildlife by establishing robust biosecurity measures. • Create effective, practical guidelines for control measures that farmers can easily adopt. • Limit the impact of bTB on affected wildlife populations and ecosystems. • Develop strategies to reduce massive cattle herd culling. • Establish the extent, burden, and distribution of costs and benefits of control strategies at farm, regional, and national levels. • Ensure the cooperation of livestock producers for successful implementation of control strategies. • Enhance public acceptance of infection control measures in cattle and potentially in wildlife, including vaccination policies. • Create biomarkers to inform on the latent/carrier status of animals and assess the risk of shedding and transmission. • Identify transmission pathways within and between species and establish patterns of animal interactions that facilitate disease spread. • Establish rigorous surveillance and testing protocols to monitor bTB prevalence in cattle, wildlife, and humans. • Investigate genetic variations in cattle that reduce bTB susceptibility and infectivity without interfering with current testing protocols

Research on bovine tuberculosis

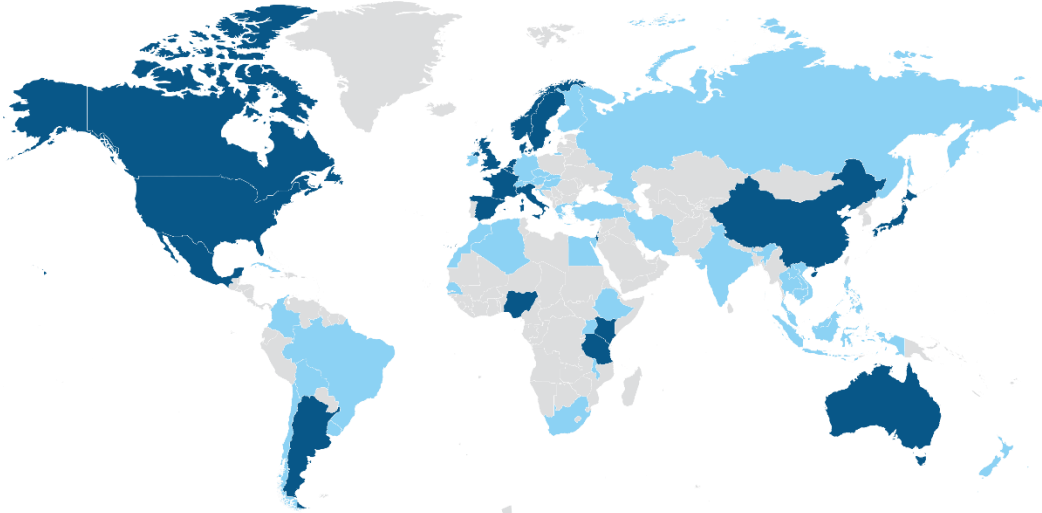
Under the STAR-IDAZ initiative, the Global Research Alliance for Bovine Tuberculosis (GRAbTB), has been instrumental in fostering international collaboration to tackle bovine tuberculosis (bTB). Since 2014, GRAbTB and its partners have held workshops to define research gaps in bTB epidemiology, diagnostics, and vaccines. In 2017, following these assessments, STAR-IDAZ, in collaboration with GRAbTB, drafted three research roadmaps covering these key areas. The vaccine roadmap was initially finalized and published in March 2018. The vaccine roadmap has been updated along with the refined versions of the developed roadmaps for control strategies and diagnostic tests after an expert workshop in Birmingham in December 2017 and a GRAbTB Executive Committee meeting in London in July 2019. Following a bTB workshop in February 2023 in Birmingham, all [the roadmaps](#) were updated, and validated by the STAR-IDAZ Scientific and Executive Committee

Conclusion

In light of the established research priorities, STAR-IDAZ IRC supports targeted funding to expedite the development of enhanced control methods for bovine tuberculosis, in alignment with the recommendations of the working group. These efforts exemplify the IRC's dedication to advancing global health and welfare through collaborative research and strategic initiatives.

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Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses



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Are you a animal health research funder/programme owner wishing to join the STAR-IDAZ International Research Consortium?

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