

NRCPD-OUAVM Joint Research Report

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Project no: 2024-joint-3

1. Principal investigator

Name: Liqing Ma

Position: Professor

Affiliation: Qinghai Academy of Animal Sciences and Veterinary Medicine, Qinghai University, China

2. Project title:

Uncovering tick vectors that transmit zoonotic *Babesia* species in China

3. Collaborating research group members at NRCPD

Name: Naoaki Yokoyama

Position: Professor

4. Research period (in mm/dd/yyyy, and total number of years)

April 1, 2024- March 31, 2025: one year

5. Purposes and objectives

Human babesiosis is an emerging tick-borne zoonosis caused by protozoan parasites of the genus *Babesia*. Human babesiosis is a hemolytic disease, presenting symptoms that range from mild flu-like illness to severe anemia. The disease can be fatal, particularly in elderly and immunocompromised patients. Globally, most human cases are caused by the following seven zoonotic *Babesia* species: *Babesia microti*, *B. duncani*, *B. divergens*, *B. venatorum*, *B. odocoilei*, *Babesia* sp. KO1, and *B. crassa*-like species. In China, several human cases have already been documented, highlighting the need for effective surveillance and control strategies.

The strategies for controlling human babesiosis should consider the endemic zoonotic *Babesia* species and their specific tick vectors. Despite this, the endemic tick vectors transmitting zoonotic *Babesia* species in China remains limited, presenting challenges for surveillance, risk assessment, and public health response strategies.

The main aim of this study is to identify potential tick vectors of zoonotic *Babesia* species in China, with a particular focus on the Qinghai-Tibetan Plateau region, a hotspot of tick activities and a zone where livestock–wildlife–human interactions are common.

To achieve this goal, the specific objectives of our research are:

- To collect questing ticks from various ecological zones in Qinghai province.

- To screen collected ticks for zoonotic *Babesia* species using PCR assays.
- To map the distribution of zoonotic *Babesia* species and their vectors, thereby supporting the development of effective control strategies for human babesiosis.

6. Outline of research process

From FY2024 to early FY2025, we conducted extensive field surveys across multiple regions in Qinghai Province, including Minhe, Huzhu, Huangyuan, Menyuan, Xunhua, and Guide, with a particular focus on grassland habitats and forest edge environments. Questing ticks were collected using a flagging method. Ticks were morphologically identified to the species level, using established taxonomic keys, and their DNAs were extracted. The tick DNAs are currently being screened in the PCR assays developed by Prof. Yokoyama's lab at NRCPD, targeting seven major zoonotic *Babesia* species. Positive samples will undergo sequencing and phylogenetic analyses to identify the specific zoonotic *Babesia* species. The resulting data will be used to create an epidemiological map, illustrating the geographical distribution of zoonotic *Babesia* species and their potential vectors.

7. Outline of research achievements

- Over 3,000 questing ticks were successfully collected and cataloged across Qinghai province.
- Morphological identification of the collected ticks confirmed the presence of *Haemaphysalis qinghainensis* and *Dermacentor nuttalli*.
- DNAs were extracted from all collected ticks, and PCR screening for zoonotic *Babesia* species is currently in progress.
- Collaboration with NRCPD has been strengthened through training and technical support.
- Our laboratory has gained valuable experience in advanced pathogen detection techniques, enhancing our diagnostic and research capacity.

8. Publication of research achievements

In Progress.