# Babesiosis effect on animals and human health and one health approach for prevention

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## ABSTRACT

Babesiosis is a tick-borne infection that can lead to the death of animals as well as human beings due to Babesia species. In cattle and other small ruminants, it causes higher mortality rates, decreased milk and meat production, loss of sperm, and significant economic loss whereas in dogs and horses it lowers their utility and value. In humans, the disease results in mild flu-like illness to severe disease threatening cases, such as anemia, kidney failure, and respiratory distress to the elderly and immuno-compromised. The solutions lie in control through management of ticks, improved animal care, human protection, community awareness and safe medical practice. Being an animal, human, and environmental health problem, babesiosis needs a One Health approach that will integrate veterinarians, medical professionals, environmental experts, and policymakers to mitigate its transmission and protect livelihoods and human health.

**Keywords:** Babesiosis, animal health, human health, prevention, control

**To cite this article:** Khair UU, Z Fatima, K Parveen, J Azeem & MA Qureshi. Babesiosis effect on animals and human health and one health approach for prevention. Biological Times. 2025. October 4(10): 42-43.

**Introduction**

Babesiosis is an emerging medical parasite of veterinary and public health concern. It is induced by protozoan parasites of the genus Babesia, which are conveyed mainly by the bite of the infected hard ticks, in particular, the representatives of the genus Rhipicephalus and Ixodes (1). Babesiosis in animals, especially cattle and small ruminants, leads to high death rates, decreased milk and meat productions, poor reproduction, and huge economic losses to farmers.

Babesiosis in humans is thought to be a new zoonotic infection which has a very similar clinical manifestation to malaria. Cases have been on the rise in various parts of the globe especially where the population of the ticks is dense. Human babesiosis may be mild with a flu-like condition to severe, life-threatening disease, particularly in the elderly, people with compromised immunity, or those who have undergone a splenectomy (2).

The close relationship linking the health of animals, human health and environment is what makes babesiosis a growing concern. Due to the spread of climate change, deforestation and increased contact between livestock and wildlife, disease transmission is also increasing. This not only turns babesiosis into a veterinary issue, but also a One Health problem that needs collaborative efforts between veterinarians, medical professionals, public health workers and communities (3). Since it has a dual effect on animals and human beings, it is imperative to point out the significance of awareness, prevention, and joint control mechanisms.

**Animal health consequences**

Babesiosis is among the most critical tick diseases of animals and pets that lead to severe illness and losses. In cattle, it is also commonly referred to as Redwater disease as infected animals excrete reddish, or coffee-colored urine as a result of red-blood cell destruction. Animal manifestations of the disease include fever, loss of appetite, weakness, rapid breathing, yellow or pale mucous membranes (jaundice) and swollen lymph nodes. Those badly affected animals can fall and die when they are not treated promptly. The expectant animals abort and convalescing animals are usually weak weeks later, which results in low productivity and poor growth (4).

Babesiosis causes great economic losses to animals. Farmers experience losses due to reduced milk production, lower weight gain in beef cattle, lower wool and meat quality in small ruminants and lower draught power in working animals such as buffaloes and horses. The death rate in young or new stock is often very great (5). In endemic areas, those animals that survive tend to act as carriers of Babesia as they silently transmit the disease to other people via ticks. They also affect dogs and horses, where symptoms such as anemia, fever, and weight loss occur making them useless and of less value. Therefore, not only animal health, but also livelihoods and income of farming communities are directly affected by babesiosis.

**Effects on human well-being**

Human Babesiosis is a new public health issue especially in places with a high level of tick infestation or in areas where livestock, wildlife and humans are in close contact. Most of the time, the infection is usually contracted due to the bite of a tick, however, in some cases, it can be passed on through contaminated blood transfusion, organ transplants or even between a mother and an infant during pregnancy.

Healthy people can experience mild flu-like diseases including fever, chills, sweating, fatigue, headache, and muscle pains to a great extent. But when it occurs in the elderly, in people with a weak immune system (HIV/AIDS, cancer treatment), or in individuals that have undergone the removal of their spleen, the disease can become fatal. Severe cases of babesiosis may lead to hemolytic anemia (red blood cells destruction), jaundice, kidney failure, low blood pressure, breathing problems, and even death when not treated in time (6).

Due to the similarity of babesiosis and malaria, particularly in tropical areas, the disease can be misdiagnosed and treated as malaria with the underlying causative agent not properly managed. This causes treatment delays and increased mortality. As the world becomes more globalized, more people move, and animals move too, babesiosis is no longer limited to its original borders, so it is becoming a new zoonotic disease of global importance.

**Controlling Strategies and One Health Approach**

Babesiosis is primarily prevented and controlled through good control of ticks, as ticks are the original carriers of the disease. The farmers are expected to check their animals on regular basis to identify ticks especially around the sensitive parts of the animals like the ears, udder, the tail, and between the legs. One of the most widespread control mechanisms is the use of acaricides by means of dipping, spraying, or pour-on application, although it is essential to change the chemicals on a regular basis to prevent resistance development. Management of pastures is also a major factor, since overgrazed and shrubby fields are the best breeding grounds for ticks (7). Cultivation of fields, rotation of grazing fields and trimming of tall grass around the sheds of animals, can significantly decrease the tick population. Moreover, the introduction of tick-resistant breeds or crossbreeding the domestic stock with the resistant ones can be an effective long-term solution. There are areas where there are vaccines that protect animals against severe babesiosis (8). In combination with such precautions, proper nutrition and general animal hygiene can enhance immunity and livestock will be more resistant to infection. Farmers also need to seek veterinary help when animals exhibit any of the warning signs including fever, weakness, or reddish colored urine because early treatment will save lives and curb the spread of disease. In human beings, prevention is the best strategy of avoiding tick bites. Individuals working on farms, fields, or in forested places ought to dress in safeguarding clothes like long sleeves and trousers and use tick repellants to bare skin and garments. Ticks tend to be in areas of the body that are difficult to see such as the scalp, armpits, and the groin, hence one should examine the body after outdoor activities, particularly in high-risk places. Educating the community is also necessary to make people aware of how ticks spread babesiosis and how to identify its initial symptoms. Blood banks must embrace stringent screening measures to avoid cases associated with transfusion. Medical practitioners and other health personnel are also expected to be trained to suspect babesiosis in patients exhibiting malaria-like symptoms especially in tick-infested regions so that they can be diagnosed and treated early. Babesiosis is a disease that causes a connection between animals, humans, and the environment, thus its management must be a One Health approach. This implies that veterinarians, doctors, environmentalists and communities should be collaborative (9). The transmission cycle must be disrupted by joint tick surveillance, integrated control programs and coordinated outbreak reporting. Schools, farmer groups and local health centers can participate in awareness campaigns, and the government should take supportive policies to promote collaboration between livestock-human health and environmental sectors. To sum up, only a joint effort can help to fight babesiosis: farmers who can minimize the number of ticks in animals, families that will not be bitten, veterinarians and doctors who can treat and cure the disease on time, and policymakers who can facilitate the use of integrated tick management programs. By working together in this, the productivity of the animals and the health of man can be taken care of (10).

**Conclusion**

Babesiosis is a significant danger which impacts on both the productivity of the animals and human health. When their animals are infected, farmers are deprived of income and people are at risk of serious illness in case they become infected. Since the ticks are the familiar connection between animals and human beings, the illness cannot be addressed in solitude. The solution to the control of babesiosis lies in a One Health approach, which is a collaboration of animal health, the health of humans, and environmental management. The prevention of tick contact, awareness creation, and collaboration will help protect livestock and human health and help facilitate sustainable livelihoods.

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