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Ticks and Tick Control Strategies with Perspective of One Health

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ABSTRACT

Ticks are a huge issue for both livestock and people in Pakistan. They can spread a bunch of different diseases, like protozoa, viruses, and even bacteria like spirochetes. Ticks are a major source of pathogens that can be passed on to people and animals. Favorable climatic and environmental conditions increase the production of ticks, but they're mainly found in the summer months (June-September) and goats are more likely to get them than sheep. Babesia, Theileriosis, and CCHF are all tick-borne illnesses that affect people who work with cattle, like slaughterhouses, veterinarians and hospitals. CCHF has been a problem in Pakistan for the past 16 years, with an average of 24% of cases resulting in death. To get rid of ticks and stop the spread of zoonotic diseases, mass tick control campaigns have been put in place in Punjab and Sind. These campaigns use lots of deltamethrin, as well as Ivermectin. Tick control methods have been used for decades around the world, but only chemical methods are still used in Pakistan. The effectiveness of each method depends on the number of ticks, their dispersal, their morphology, and the host species. We're using too much of these chemicals to try and get rid of ticks on people and animals. We need to keep coming up with new ways to get rid of ticks, like using tickbot, using bait boxes, finding new vaccines, taking advantage of the natural wildlife, and using natural pesticides. All of these things will help us get rid of the ticks and have a huge impact on reducing the number of them. Modification of habitat, environment and integrated pest control techniques are used to control ticks with perspective of one health.

Introduction

Ticks are an ectoparasite of domestic and wild animals all over the world, especially in tropics and subtropics, including in Pakistan. Ticks are vectors of several viral, protozoan, rickettsial and bacterial diseases which can be transmitted directly and indirectly to humans, animals and birds and to wild fauna. Among viral infections, Congo haemorrhagic fever (CHF) is the main health issue in Pakistan. The highest virus cases with the highest case-fatality rate were reported in 2014 all over Pakistan [1]. The livestock industry is one of the most important sources of income for the poor people of Pakistan, as it provides them with a variety of proteins, milk, meats, and wool. However, the presence of ticks in the environment has a negative impact on people, animals, and the environment. This is due to the fact that ticks suck blood from a variety of body parts of both humans and animals, and transmit pathogens during feeding which can lead to a decrease in milk, meat, and wool production. The effects of ticks on animals include a decrease in immune system function, loss of blood, irritability, general stress, skin and skin damage, and skin and hide damage [2].

Ticks have been observed to have a range of host contact patterns, with each stage of their life cycle completing one, two, or three hosts. Boophilus microplus and Dermacentor albipictus are one host specific ticks. While the other three Rhipicephalus sanguineus, Dermacentor variabilis and Hyalomma anatolicum are two or three host specific ticks which use different individuals for each stage of adult development, nymph development, and larva development. Tick infestations can have a huge impact on cattle's productivity, from the direct effects of being attached and fed (known as tick worry), to the injections of toxins, to hide damage caused by their bites, to weight loss caused by the suck of blood by adult ticks (known as rhipicephaluses microplus), to milk production and quality being reduced, and to the illness and death caused by the diseases they spread [3].

The presence of ticks in Pakistan can be attributed to a variety of factors, such as the migration of animals from infested areas to non-infested regions, the introduction of alien species, urbanization, tourism, and the loss of biodiversity. These factors, in turn, can lead to the spread of ticks. Ramzan identified the preferred body sites of animals to be susceptible to tick infestation or attack, which were reported to include the ears, abdomen, tail, and testes. Climate change, land utilization, water availability, environmental conditions, and the physical geography of Pakistan are all significant contributors to the spread of ticks [4].

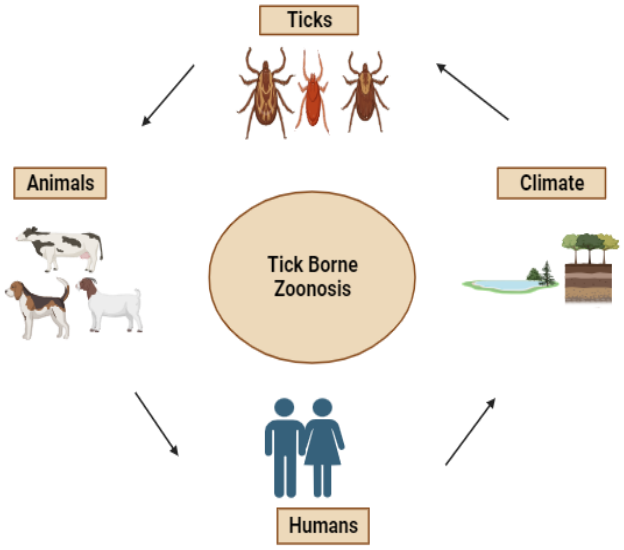

Fig. 1: Indicates Tick Borne Zoonosis

Control Strategies:

If you want to keep ticks away from your animals, there are a few different ways to do it.

- **Construction of tick proof building:** If you're dealing with tick infestations, it's important to make sure your cattle and buffaloes, whether they're crossbred or not, are built in a way that's tick proof. Exotic and crossbred animals are more prone to ticks than regular livestock, so it's a good idea to fill any cracks or crevices in the walls of your cattle or buffaloes' sheds with cement. It's a cheap way to reduce the tick burden.
- **Removal of Waste from farm:** Another way to keep ticks away is to get rid of the piles of dung and piles of bricks in animal sheds every day, which are the main breeding ground for ticks.
- **Burn debris in the vicinity of the shed walls to eliminate the stages of ticks:** Cracks and Crevices are eggs-laying places for ticks and hiding places for larva and nymphs as well as adults during the

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day, especially in the winter. Burning waste materials near the wall of animal sheds kills the tick stages and reduces tick infestation [5].

- **Quarantine:** Newly acquired animals can be housed in a separate shed from existing animals. Animals that have ticks on their body must be treated with anti-ticks before being housed with existing animals.
- **Pasture spelling and rotational grazing:** Rotational Grazing and Pasture Spelling can be useful in reducing the tick population. According to David (2005), the change reduces the maximum tick population in grazing. The rotational Grazing & Pasture Spelling has reduced the one host number of Ixodid Ticks but is not effective against multi-host Ticks. Rotational grazing and pastures spelling can give the best results against ticks in the developed countries, including Australia, whereas this strategy is not used very often in New Zealand. The ranges and pastures in developing countries such as Pakistan are mostly public knowledge regarding ownership, so this tick control strategy, pasture spelling, is not very useful [6].

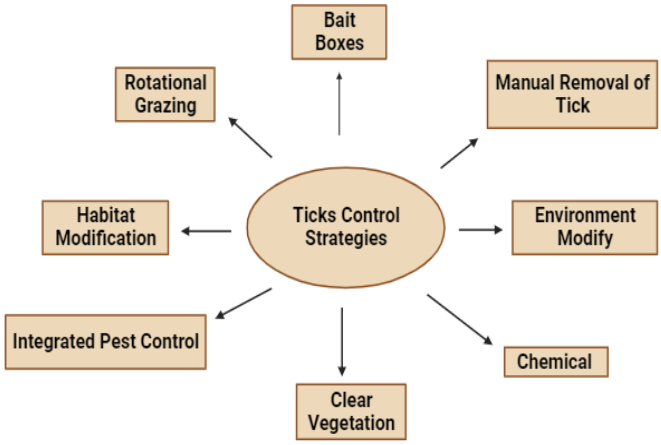

Fig. 2: Indicates the Control Strategies

- **Manual removal of ticks:** Manually removing ticks from an animal's body at an early stage can be a highly effective method of reducing tick infestation. This method can be used in small-scale operations where the livestock population is sparse. Forefingers can be used to remove ticks from animals that have been infested during milking, and the collected ticks can be killed by lighting a fire. It is important to adhere to the necessary precautions when removing ticks. In some cases, the blood of ticks can transmit pathogens or be the source of diseases, such as Lyme disease and CCHF, which have been reported from a number of countries, such as Pakistan. The World Organization for Animal Health (OIE) has stated that the majority of disease transmission is caused by tick crushing between the fingers [7].
- **Clearance of vegetation:** It has been observed that a variety of tick species have been collected from vegetation. These species are commonly found on the grass blades, where they congregate in search of a host, a process known as questing. By properly clearing grasses and other areas that are preferred by these species, it is possible to reduce the level of tick infestation. This can be achieved through the use of tickbot, which has been demonstrated to be effective in controlling questing ticks.
- **Bait boxes:** Rodents are a major contributor to the growth of ticks, which in turn are a source of pathogens on dairy farms. Control of rodents and ticks on the body through the use of bait boxes may be the most effective approach. These baits can be installed in sheds to reduce the number of ticks present [8].
- **Chemical Control:** Acaricides are a type of systemic and direct contact poison that have been used to control the maximum pest population in cattle and other animals. They are available in various formulations, such as Emulsifiable Concentrate (EC) and Wettable Powder (WP). Taylor 2001 has demonstrated that the insect growth regulator/acarine has the potential to affect the nervous systems of ticks, and this has been demonstrated to be the most effective approach to control these pests. The chemicals are applied to cattle by various sprayers, such as Bucket-Pump Hand Sprayersrs, or m of Pher, Omeones, and the dipping method has been reported to have harmful effects. Therefore, it is essential to check for any wounds on the animal's body prior to dipping it in a treated pond, as this can lead to toxicity and the development of skin diseases.

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