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# How to Improve Tick Control Programs

**Félix Valcárcel*, Angeles Sonia Olmeda**

Parasitology group, INIA (Spain) and A.Sonia Olmeda, Veterinary School of UCM (Spain).

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***Corresponding Author:**
Félix Valcárcel

**Email:**
valcarcel.felix@inia.es



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**Brief about authors:**

**Félix Valcárcel**

Dr. Félix Valcárcel's research interests are primarily in the areas of veterinary science with emphasis on the study of parasites. Currently he is working in Parasitology group, (INIA, Spain). He is also serving as scientific editor at PSM Veterinary Research.

**A.Sonia Olmeda**

Prof. Dr. A.Sonia Olmeda is specialist on tick control. She is working in the Veterinary School of UCM (Spain).

**Email:** valcarcel.felix@inia.es

## Editorial

Ticks are forced blood sucker ectoparasites that feed on many different vertebrate hosts and constitute the most important group of vectors to animals and the second group to human. In Africa the control of ticks -and tick borne diseases (TBD)- is the most important economical problem from a sanitary point of view, even compared with trypanosomiasis or tsetse fly (Jongejan and Uilenberg, 2004). Indeed, climatic change is probably contributing to an increase of their populations either on field either on time. This expansion is probably backing to the re-emergency of some TBD.

Although there are efficient products against ticks, in some cases they are losing their effectiveness as a result of resistance development. Resistance is the ability of some parasites to tolerate toxic doses of a drug that would be lethal to most of their congeners. Actually, there are reports about tick resistance to formamidine, amitraz, permethrin or fipronil (Nolan 1994, Chen et al. 2007, Davey et al. 2008, Rosado Aguilar et al. 2008, Miller et al., 2007, Castro Janer et al. 2009). Even, Abbas et al. (2014) have reviewed the status of cattle reporting that there are resistant ticks to all the drug classes. It is important to alternate acaricides with different action mechanisms and to check periodically the efficacy of drugs to avoid resistances. In that context, the researchers and Pharmaceuticals companies are focused on finding acaricides through new molecules or natural products. Unfortunately, the development of new product is an expensive enterprise and the market price limited the use of new tools to companion animals of developed countries.

Some traditional measures could be useful for tick control; burning pastures to stimulate germination of the seeds is also effective against no parasitic stages of ticks (White and Gaff 2018); reduction of tick refuge by mowing weeds and grasses reduces the soil moisture and the lift litter (Clymer et al. 1970; Schulze et al. 1995); modulation of host availability, as it was done for the control of *Ixodes scapularis,* main vector of Lyme disease in USA, by the reduction of deer population access to restricted areas (Gray 1998).

One of the most important aspect on vector control is to stablish a strategy adapted to natural conditions and the species to manage. Nowadays, almost everybody know there are differences between *Anopheles* and Culicinae mosquitoes and the diseases they can transmit. Nevertheless there is not that level of knowledge about ticks when the efficiency of control strategies depends on how adapted they are to the type of tick, hosts and environment. In order to make understand the importance we are going to use three species of ticks: *Rhipicephalus (B) microplus, Rhipicephalus bursa* and *Hyalomma lusitanicum.*

*R.(B) microplus,* the most worrying tick affecting cattle over the world, is a one host tick which all stages feed on the same host. The life cycle is completed in a short period of time (approximately 21 days from larvae to adult on host, 15 days to laid egg by engorged female and other 15 days to hatch larvae). Larva is the only stage that need to look for a hosts and they are in pasture at any time. The control should combine actions on the host, through acaricides or vaccines, and management of environment to control oviposition in soil and host seeking larvae.

*R.bursa* is a diphasic and monotropic tick feeding as immature and adult on horses or ruminants. Although immature infestation in fall is not so evident than adults in early summer. In order to avoid transtadial transmission of pathogens, for example *Theileria equi*, control measures should be mainly focused on larvae and nymphs while feeding on hosts and not just in adults, as it is usual. Media measures to control larvae and adults looking for host and female oviposition are also recommendable.

*H.lusitanicum* the most abundant tick in many meso-Mediterranean areas, important as vector of diseases of Veterinary and Public Health importance, is a triphasic ditropic tick. As larvae and nymphs feed on wild rabbits, moulting twice in the nest. Host seeking adults are abundant in soil from early spring to late summer and feed mainly in ruminants. Control for this species is really difficult because at the same time coexist 4 cycles in different location (rabbit, deer, nest, soil) and development stages. For that it is essential to apply an integrated management tick population plan combining different strategies at bottleneck of the cycle. The most important aspect is the management of host population, not always possible. Another measure could be avoid infestation by environmental measures trying to reduce host seeking ticks, or to reduce host burden by the treatment of them with acaricides when the infestation is higher (rabbits in summer and deer in spring). The success of the control plan should be the reduction of *H. lusitanicum* population into tolerable limit. The elimination of the tick is out of the expectation objective not just because is not possible, but not convenient.

In conclusion, the future of tick control would be based on the knowledge of the species involved, its physiology, necessities, range of hosts and environment conditions in which should be developed, and not just in the use of acaricides on useful animals for man. That is the premise for tick control success and our task for next generation to avoid the overuse of acaricides to keep them effective avoiding resistances.

## CONFLICT OF INTEREST

The author has declared that no conflict of interest exists.

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