10 - Controlling ticks (methods)

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Several studies have been aimed at finding efficient methods to control ticks, hematophagous ectoparasites of great economic and sanitary importance. Currently, the most effective strategy is the chemical control (via synthetic acaricides); however, this method has several disadvantages, such as the high cost of products, application and storage, and the damages caused by residues to nontarget organisms and the environment, as the chemicals impregnate living tissues (Pruett, 1999; Freitas et al., 2005; Oliveira et al., 2008, Oliveira et al., 2009).

The literature has reported that, even in minimum exposures to the different pesticides (including acaricides), the nontarget organisms can suffer dramatic consequences, such as acute poisoning. Moreover, the residues of such substances seriously affect public health through
the contamination of the food chain. The use of pesticides indirectly interferes with the entire wild life, eliminating not only the pests, but also other organisms (nontarget) which play an important role in the biological balance (Pruett, 1999).

Over the last decade, acaricides based on different chemicals (arsenic, organochlorine, organophosphate, carbamate, nitroguanidine, phenylpirazol, formamidine, pyrethroid, avermectin and benzoylphenylurea) (Häuserman et al., 1992) have been widely used. Ticks develop several survival mechanisms and strategies, decreasing the level of chemical penetration into the organism, modifying the metabolism and altering processes of storage and excretion and sites of toxic action. These mechanisms make the ectoparasites less susceptible to the products; therefore, new active ingredients are frequently launched in the market in an attempt to keep up controlling these pests (Nolan, 1985).

Crampton et al. (1999) reported that an active ingredient could lose its properties in 5 to 10 years, due to the selection of resistant strains caused by the intensive and/or incorrect use of the compounds, opposing the manufacturer recommendations (Häuserman et al., 1992). Furthermore, it is known that, once resistance to a particular acaricide is acquired, the process is irreversible, and the chemical will no longer be efficient to control the ectoparasites (Crampton et al., 1999).

On the other hand, the search for alternative control methods, less polluting, inexpensive and with lower incidence of resistant strains has been intensified over the last years (Rosado-Aguilar et al., 2010). The biological control is one of these strategies, using natural predators, such as the cattle egret (*Bubulcus ibis*) (Gonzales, 1975), or parasites, as *Escherichia coli*, *Cedecea lapagei* and *Enterobacter agglomerans* (Brum, 1988) and fungi, as
Metarhizium anisopliae, which parasitize the ticks (Da Costa et al., 2002).

Another alternative is the use of compounds of natural origin, i.e., products made of plant extracts, whose active ingredients have the potential to control pests (Guerra, 1985).

Acaricides based on plant extracts have been proven to be a very promising alternative, especially when the high levels of synthetic acaricide consumption and the toxic effects to the environment and nontarget organisms are considered (Martinez, 2002; Borges et al., 2011). Therefore, the development of further research on plant derivative compounds will certainly ground the formulation of safer and more suitable products to replace the synthetic ones (Panella et al., 2005; Dietrich et al., 2006).

Considering all the above information, the development of studies aimed at elucidating the action of synthetic and natural acaricides on the cells, organs and tissues of these ectoparasites is of the utmost importance, as it will ground the search for efficient and sustainable control strategies.