



Research of essential oils to control livestock parasites

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Ecto and endoparasites cause major damage to livestock production in Brazil and worldwide. The economic losses are related to decreased production of meat and milk, hide damage, control costs (labor, equipment, facilities, antiparasitics) and death of animals caused by tick-borne diseases. A recent estimate of annual losses caused by cattle ticks alone was around \$3.24 billion. The annual losses due to the major ectoparasites such as ticks and flies, and gastrointestinal worms of cattle reach \$13.9 billion in Brazil (1). Parasite control has largely been achieved using chemical drugs, but over-reliance on these products has led to the development of multi-class parasite resistance. This is one of the main reasons for the large number of studies looking for new bioactive compounds from plant extracts, including essential oils. Most of these substances are effective *in vitro* through direct action, causing mortality of the parasite, or indirect action, interfering in the development/ metamorphosis, reducing female fertility and causing repellence. Moreover, compounds from plants can paralyze nematode tissues, making them unable to feed, leading to death. Studies of the use of essential oil compounds for parasite control need to pay attention to extraction methods, determination of lethal concentration (LC) *in vitro*, toxicity to the host, effective dose *in vivo*, residual period, stability, residues/metabolites generated and costs. All these aspects can be better understood when the main substances contained in the extract are identified (2). However, this research area faces some serious constraints to attain *in vivo* the good results achieved *in vitro*. It is common to find that when a plant extract produces good effects *in vitro*, the *in vivo* results fall short of expectations because of toxicity to the host from the high doses of essential oil required to achieve good efficacy *in vivo*. With the identification of plant species having potential use in veterinary parasitology, studies of the production of formulations should be conducted with participation of experts in chemistry and pharmacology and also with veterinary drug companies. This is necessary to evaluate the most appropriate adjuvant and to develop formulation models that can be adapted according to the nature of the plant extract or bioactive compound isolated (3). A recent study of our research team achieved low LCs *in vitro* against the cattle tick and the nematode, *Haemonchus contortus*, with the essential oils of *Croton cajucara*, *Croton sacaquinha*, *Curcuma longa*, *Lippia alba*, *L. gracilis*, *L. organoides*, *L. sidoides*, *Mentha arvensis*, *M. piperita*, and *Zingiber officinale* (unpublished data). However, it is important to make farmers understand that while direct use of essential oils to manage parasites is possible, caution is necessary. Moreover, they also should be aware that antiparasitics are not the only alternative for parasite control and rational use is required to avoid parasite resistance to the new product (be it synthetic or natural) (4).

1. Grisi, L. et al. Braz. J. Vet. Parasitol., 2014, **23**, 150-156.
2. Chagas, A.C.S. CAB Reviews, 2015, **10**, 1-8.
3. Chagas, A.C.S. et al. Parasitol. Res., 2012, **110**, 295-303.
4. Gaínza, Y. A. et al. Ind. Crops Prod., 2015, **76**, 647-652.

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