NEW IN VITRO TEST TO EVALUATE THE RESISTANCE LEVEL OF THE CATTLE TICK, Rhipicephalus (Boophilus) microplus, AGAINST ACARICIDES

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The cattle tick Rhipicephalus (Boophilus) microplus is a key vector of bovine babesiosis and causes high economic losses to farmers which have become even more prominent due to the widespread resistance against acaricides. Monitoring of tick resistance could help to identify emerging problems and to slow down its spread. The objective of the present study is to compare two new in vitro tests designed to evaluate the resistance level of R. microplus with the two tests currently recommended by the Food and Agriculture Organization of the United Nations (FAO): one performed on larvae, the Larval Packet Test (LPT) and one performed on adults, the Adult Immersion Test (AIT). Two new tests, the Larval Tarsal Test (LTT) and the Adult Contact Test (ACT), were developed at Novartis Animal Health. Both FAO- and the two Novartis tests are based on in vitro exposure of larvae or engorged females to serial dilutions of acaricides. However, the type of contact with the active ingredient (AI) differs among the tests. In the LPT, larvae are enclosed in filters soaked with AI and forming a packet while the LTT is performed in microtiter plates and larvae have tarsal contacts with the AI coated at the bottom of the wells. In the AIT, adults are fully immersed in the AI solution while the ACT ensures a full body contact of the adults with the AI, without immersion. A sensitive (Muñoz) and a resistant R. microplus reference strain (Ultimo) were selected and their susceptibility to 10 compounds from 6 classes (organophosphates, synthetic pyrethroids, formamidines, macrocyclic lactones, carbamates and pyrazol) was evaluated with the different tests. First evaluations showed that both adult tests require a large number of engorged females to obtain a full dose-response mortality curve for several compounds. For the larval tests it became evident that the LPT is far more labour-intensive and time-consuming than the LTT, with which several compounds can be tested at the same time within one 96-well microtiter plate. The LTT is therefore more suitable for large-scale studies and detects resistance with lower doses than the ones required by the LPT.