Overview of the actions since the last Forum on Plants Rich in Tannins

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Goals

The *in vitro* methods are extremely useful in screening substances of plant origin with potential activity against helminth parasites. The assays can be performed with eggs, first and third stage larvae and adults and are able to detect if plant extracts can inhibit the hatching, development, feeding, movement and exsheathment of the parasites. At the same time, *in vitro* methods can be an important tool for the rational management of chemical groups and to indirectly maintenance the *refugia* in the population through alternative herd management. So, in the 2008 meeting it was noticed that the *in vitro* methodologies were not widely known within the research groups in Brazil. Since that opportunity efforts have been done to promote the dissemination of the techniques, training of researchers and technicians to perform tests for the detection of new active substances and parasite resistance diagnosis on gastrointestinal nematodes (GINs).

Relevant Results

Dr. Ana Carolina Chagas was trained at research institutions abroad (Moredun Research Institute, Scotland; University of Georgia, USA) and a few techniques have been implemented at Embrapa Cattle Southeast (CPPSE) and the Federal University of Parana (UFPR). Curses were also done to students and professionals from Brazil and other South American countries. Since 2008 there were three courses carried out at CPPSE and a course at UFPR to 35 people; 25 from Brazil, five from Argentina, three from Colombia and two from Uruguay, through lectures and practical classes. Recently a questionnaire was sent to the professionals who participated of the previous courses and it was determined that 15 projects involving the *in vitro* techniques were submitted to funding agencies asking for equipment and consumables. Moreover, these techniques were transferred to more 32 professionals in different institutions. In 2011, through the course Advances in Knowledge of Ruminant Parasite Resistance of Parasites and Hosts and the second course at UFPR, another 60 professionals will be trained in these methodologies, including molecular techniques for resistance diagnosis.

A major concern in this area is the standardization of techniques between laboratories, so the results may be compared and validated. Some actions have been carried out in Brazil for this purpose, such as the publication of the "Practical Handbook: Methodologies for Resistance Diagnosis and Detection of Active Substances in Ruminant Parasites". In addition, projects for the establishment of research networks in this theme have been produced. Within them we expect to provide a collection of susceptible and resistant isolates and their establishment on donor hosts for joint use within the research networks.

Future Challenges

More comprehensive studies are needed to assess if the bioactive compounds are being disposed in faeces or which metabolites are being generated after administration. In

addition, the egg hatch test (EHT) and larval development test (LDT) should be done using faeces from the animals that received the bioactive to detect if decreasing pasture contamination levels can be reached. These details will help to conduct a controlled experimental design to test substances or extracts from plants. The development of strategies based on reliable *in vitro* tests may reduce the dependence on *in vivo* experiments.

It is imperative to investigate and scientifically validate phytotherapeutic alternatives for future use on GIN's control in ruminants. Therefore, it is important to follow all steps that come before the clinical experiment. However, it is a challenge to understand why there is so much difficulty in reaching the same significant results from the *in vivo* compared to those obtained in the *in vitro* tests. In some studies this can be due to destruction of the compounds in the rumen or maybe the *in vitro* results cannot be compared because of the inadequate adjuvant compared to the *in vivo*. The R&D support from drug companies is essential, since problems with absorption through the gastrointestinal tract and drug solubility are the main obstacles from *in vivo* studies to obtain the same anthelmintic effect detected in the *in vitro* tests.