Worm control with remote integrated systems technology

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Research Institute: Faculty of Veterinary Science, University of Pretoria

Research focus area: Animal Health and Welfare

Full Title of the project

Worm control in small ruminants using remote integrated systems technology on communal and commercial farms

Aims of the project

- To develop software to enable farmers to make quick on-farm decisions on worm control, without the need for frequent laboratory sample analysis
- To investigate use of remote sensing methodology for early diagnosis of effect of worm infection on small ruminants
- To develop mathematical models for integrating ultramodern technological methods with ecological factors impacting on worm development and thus worm control

Executive summary

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J.A. van Wyk, Faculty of Veterinary Science, University of Pretoria

Project plan:

The project comprised a building block in a long-term initiative, through cellphone-mediated collection and submission of on-farm generated clinical animal health- and activity- and ecological data, to: (i) develop an automated, computer model-based decision support system; (ii) to evaluate and interpret input data on animal health; and (iii) generate recommendations and simplified explanations for farmer training.

At present exchange rates, the total funding obtained for the project amounted to slightly in excess of R4 million.

Setbacks:

Due largely to the novelty of using low-cost telemetric animal activity systems, serious setbacks occurred: (i) insolvency of the manufacturer of the first telemetric system tested; (ii) destruction by Tsunami, of a factory in Japan supplying crucial components for the replacement system; (iii) a breakdown of transponders of the replacement system, when modified by us for increased sensitivity. There were also further setbacks, including (iv) the demise of the communal farmer involved in the trial in KwaZulu-Natal; and (v) predator attack on trial animals. However, recovery from the setbacks was good, enabling good progress in the project.

Trials conducted:

Five widely-disseminated production trials involving 500 sheep and goats were conducted, mainly as background to telemetric animal activity monitoring for early detection of helminthosis or other conditions. Farmers played a crucial role by doing most of the clinical evaluation and sample taking. As previously, differences between targeted selective treatment with FAMACHA© for treatment of only clinically affected animals and unsustainable monthly drenching were small.

Firsts from cooperating project partners in the UK were: (i) successful use of FAMACHA© for monitoring liver fluke in sheep; (ii) detection with a non-transmitting human pedimeter, of subclinical non-bloodsucking worm infection of sheep; and (iii) estimates of amount of moisture required for migration of nematode infective larvae from faecal deposits, to pasture.

Telemetric animal activity monitoring:

The replacement telemetric system has been deployed with success as regards the recording of activity data from trial animals. A considerable input into a search for suitable methods of the analysis of the data for detecting gradual changes in animal activity in relation to mounting worm challenge is starting to pay dividends, for instance with detection of some relatively low-level physiological and health phenomena. This initiative is continuing with partners from the USA.

Training and technology transfer:

Totals of 13 scientific articles in refereed journals, 5 full-length papers in peer-reviewed conference proceedings, and 8 conference abstracts were published on this initiative over the course of the project. In addition, 2 training manuals were produced, and during the project there were 32 training/quality control evaluation occasions involving approximately 232 trainees in South Africa, 67 in Botswana and 110 in India.

Studentships:

As reported before, two PhD, one MSc, one BTech and an Honours student were involved in the project for which our metadata set proved to be indispensable. Amongst others, good progress was development and validation of two different mathematical models developed by the PhD students.

Cooperation with other research teams: A variety of different international and local research teams not only cooperated in the project, but are also constantly applying with us for the necessary funding to enable continuation with the initiative.

Additional comments:

It should be taken into consideration that this project is part of long-term, ground-breaking research, aimed at helping both commercial and communal farmers to make full use in practice, of novel electronic aids that have thus far been economically out of reach to all but a select few of the very intensive farmers, such as in the dairy industry. In the process setbacks were to be expected, as duly occurred in the project. On the other hand, the extent to which the serious setbacks duly encountered were successfully overcome during the relatively short period of the project is of importance when evaluating the level of success eventually achieved. Furthermore, the extent of external funding obtained from abroad gives an indication of the importance attached to the project objectives by funding bodies, research organizations and groups concerned and of the value to local farming in relation to the total project cost.