PROJECT OVERVIEW

TITLE:

Evaluation of ethnoveterinary medicines through biological activity screening of medicinal plants in South Africa to assist resource poor livestock owners with appropriate and reliable information

PURPOSE:
Benefits for poor people generated by application of improved management of livestock disease

TARGET COUNTRY(S):
South Africa, Southern African Developing Countries (SADC region)

PRINCIPAL INVESTIGATOR:
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COLLABORATING INSTITUTIONS:
ARC – Plant Protection Institute; ARC Roodeplaat; University of Pretoria; University of the Witwatersrand; National Botanical Institute; CSIR

DURATION OF PROJECT:
3 years

LOCATION OF PROJECT:
Agricultural Research Council - Onderstepoort Veterinary Institute
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South Africa

BACKGROUND:
Etnoveterinary medicine (EVM) knowledge in South Africa is largely contained within oral tradition. This and past prejudice has prevented this indigenous knowledge system from becoming the subject of scientific investigation. In other parts of Africa, such as Cameroon, substantial benefit to resource-poor farmers has been shown to be achievable through the evaluation of traditional medicines and the subsequent delivery of appropriate information to farmers/livestock managers1. Ethnoveterinary medicines could be used to great advantage in the sociocultural context of resource-poor farmers in South Africa if they are encouraged to use only efficacious and safe herbal remedies and to avoid ineffective and toxic remedies. Scientific evaluation and verification of the pharmacological activity of local ethnoveterinary preparations coupled to the dissemination of scientific information to resource-poor farmers could provide better access to efficacious treatments and improved livestock health status and production. It will have a positive impact in communities that do not have access to conventional animal health care due to sociocultural and economic factors. Under certain circumstances, the use of ethnoveterinary medicines may be more appropriate than the use of conventional medicines. The abuse of certain potent conventional medicines, such as antimicrobials, could lead to the development of microbial resistance with resultant negative effects on public health. Residues of conventional drugs in food of animal origin as a result of the abuse of these medicines can also limit the development of sustainable livestock production by resource-poor farmers. Furthermore, the cost of conventional medicines is often not justified by their therapeutic benefit. The use of low-cost ethnoveterinary medicines with known efficacy and safety can therefore be more appropriate even if conventional medicines with greater potency are available2. Traditional medicinal use of plants in South Africa has been shown to be strongly related to physiological and pharmacological activity of active plant ingredients3. The use of toxic and potentially harmful plants in ethnoveterinary medicine has also been documented4, emphasising the need for the objective, scientific evaluation of the biological effects of

these plants to understand the possible benefit and the need to advocate or discourage their use.

Livestock health problems constitute an important factor that prevents RPFs in South Africa from achieving optimal livestock production. In work done by Onderstepoort Veterinary Institute (OVI) in South Africa, farmers have identified access to veterinary services and affordable drugs as major constraints to livestock productivity and health. Studies recently conducted in South Africa have indicated that EVM is widely practised and is the main animal health intervention available to RPFs4,5. Fielding (2001) makes the following statement: "Public funds and donor aid can maintain inappropriate and unsustainable systems and institutions for as long as the funds and aid continue to flow. But, once the financial support begins to fail, economic reality inevitably takes over and in the absence of other distorting factors more appropriate and sustainable systems tend to evolve. This scenario has been the recent history of many veterinary services in the tropics. For some time now these services, fashioned for the most part on a colonial model, have had to wrestle with sharply rising costs and the consequent unavailability of expensive synthetic drugs. As a result livestock keepers in many tropical countries are returning to, or staying with, the use of ethnoveterinary medicine to treat the health problems of their animals. This development is prompting a reappraisal of the potential and limitations of both ethno and modern veterinary medicine"6. At a meeting of IPUF (Indigenous Plant Use Forum) in June 2001, a group of traditional healers expressed their need and wish for the results of medicinal plant research to be made available to them in an accessible format. They also expressed frustration at the apparent lack of research geared towards their needs. There has been no systematic research in South Africa geared towards the evaluation of EVM. Due to a lack of scientific data, extension staff cannot be confident in recommending EVM use for treating livestock diseases. Information from elsewhere cannot be simply applied to the South African situation because of geographical variation in plant populations.

REFERENCES

NUWANYAKPA M P 1992 Partnership with Heufer Project International for Integrated Rural Development and Environmental Sustainability: A concept paper and an Unsolicited Proposal. HPI, Bamenda, Cameroon

WALLER D P 1993 Methods in ethnopharmacology. Journal of Ethnopharmacology 38: 189-195

FOURIE T G, SWART I, SNYCKERS F O 1992 Folk medicine: a viable starting point for pharmaceutical research. South African Journal of Science 88: 190-192

VAN DER MERWE D 2000 Use of ethnoveterinary medicinal plants in cattle by Setswana-speaking people in the Madikwe area of the North West Province. MSc Thesis. Faculty of Veterinary Science, University of Pretoria

MASIKA P J, VAN AVERBEKE W, SONANDI A 2000 Use of herbal remedies by small-scale farmers to treat livestock diseases in central Eastern Cape Province, South Africa. Journal of the South African Veterinary Association 71 (2): 87-91

Fielding D. 2001 Ethnoveterinary medicine in the tropics – key issues and the way forward? HYPERLINK "http://taa.org.uk/Fieldingdone.htm" http://taa.org.uk/Fieldingdone.htm

PROJECT PURPOSE:

- To evaluate ethnoveterinary medicines used by resource poor farmers in South Africa in terms of their biological activity to gain insight into their efficacy and safety.
- To evaluate the methods of ethnoveterinary medicine preparation, storage and use.
- To develop low technology methods of medicinal plant use appropriate for resource poor farmers.
- To develop and disseminate information to resource poor farmers that will improve their understanding of the traditional medicines they use and improve the results obtained from traditional medicine use.

OUTPUTS:

- Development of a battery of bioassay tests appropriate to the evaluation of ethnoveterinary medicines.
- Targeted medicinal plants screened for biological activity.
- Potentially useful plants selected for further study and characterisation of the biological activity of

different populations/varieties/growth conditions.

- Increased understanding of the influence of preparation and storage methods on traditional medicine activity.
- Dissemination of appropriate information through OVI's existing 'Animal Health for Developing Farmers' programme together with their partners in the government extension service, NGOs and the private sector.

CONTRIBUTION of OUTPUTS:

Resource poor farmers in South Africa will be able to make better informed decisions about using available animal health interventions. The confident use of safe and effective traditional medicines will improve livestock health and productivity, that will improve income and quality of life of poor households owning livestock.

RESEARCH ACTIVITIES:

- Identify medicinal plants used in EVM, their methods of use and indications through collaboration with existing research programmes at OVI and the University of Pretoria.
- Collection of already identified medicinal plants used in EVM. Plants will be selected for evaluation on the basis of conservation status, geographical availability and potential for cultivation.
- Preparation of extracts: water, methanol and acetone extraction
- Bioassays:
    1. Internal parasite tests: C. elegans
    2. External parasite tests: larval packet tick test; tick dipping; controlled *in vivo* testing for tick reduction in cattle; American bowlworm insecticidal assay
    3. Antimicrobial assays (bacteria and fungi)
    4. *In vitro* toxicity tests: cytotoxicity cell culture (MDCK and HT29 cell lines)
    5. Isolated ileum and uterus smooth muscle contraction assay

- Most promising plants based on bioassay results selected for further investigation.
- Characterisation of the biological activity of different populations/varieties/growth conditions
- Evaluation of storage and preparation techniques appropriate to resource poor farmers.
- Formulate recommendations appropriate to resource poor farmers
- Develop information modules
- Disseminate information to resource poor farmers through OVI's 'Animal Health for Developing Farmers' programme together with their partners in the government extension service, NGOs and the private sector.

BENEFICIARIES and TARGET INSTITUTIONS:

- The use of conventional medicines often involves high cost for the resource-poor farmer in terms of money and time spent in their procurement. Dissemination of information regarding effective ethnoveterinary medicines could lead to their widespread use by resource-poor farmers, thus freeing resources for other uses. The resultant improvement in livestock health will encourage the development of sustainable livestock production by resource-poor farmers.
- The development of ethnoveterinary knowledge and the promotion of its rational use will improve its sociocultural status, adding to the self-esteem of its users and promoting the African Renaissance.
- The development of ethnoveterinary medicine and its adoption into mainstream knowledge will enable its consideration in issues of national policy formulation and governance.
- Due to the project being part of a larger, multidisciplinary research programme involving multi-institutional collaboration, the project will facilitate the development of networks of institutions and people involved in ethnoveterinary research. Bioassay technologies have not yet been applied to ethnoveterinary medicine in South Africa.
- This project will develop local research capacity essential to ethnoveterinary research. Pharmacological investigation of ethnoveterinary medicines will shed light on the relationship between ethnoveterinary knowledge and modern mainstream pharmacology and pharmaceutics.

This will aid the development of indigenous knowledge and its use to the benefit of various fields of study such as pharmacology, pharmacognosy, pharmaceutics, toxicology, phytochemistry, ethnobotany, indigenous taxonomy and systematics, anthropology and veterinary science.

RISKS and ASSUMPTIONS:

RISKS

- Medicinal plant resources are renewable, but are at risk of degradation. Initial screening will ensure that threatened species are not included in the study. The project will link to the DFID funded 'Supporting ethnoveterinary medicine – developing evidence based methodologies' project, which includes the development of alternative sources of medicinal plants through cultivation.
- Bioassay methods used may not adequately explain the use of plants for certain indications.
- Recommendations may not be adopted by resource poor farmers.

ASSUMPTIONS

- Efficacious ethnoveterinary medicines exist in South Africa.
- The demand for low technology interventions useful to resource poor farmers will remain.
- The capacity of the Animal Health for Developing Farmers Division at OVI and other extension services to disseminate information will remain.