



Promoting the Use of Ethnoveterinary Practices in Livestock Health Management in Masvingo Province, Zimbabwe

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Research

Abstract

This study evaluated the contributions and potential of ethnoveterinary practices to livestock health management in Masvingo Province, Zimbabwe. Causes of non-adoption of ethnoveterinary practices were also determined, and recommendations for the way forward suggested. Both quantitative and qualitative research methods were used in the study. High costs and unavailability of pharmaceuticals, poor communication networks, and disintegrating government livestock health facilities were cited as some of the problems in livestock health management. Adoption of ethnoveterinary practices which are cheap, locally available, and sustainable is an alternative, especially in the face of climate change and variability. However, the respondents cited lack of documentation, inadequate diagnosis, and lack of knowledge of application rates or side effects of these practices as some of the challenges in using them. Ethnoveterinary practices are therefore mostly used in combination with pharmaceuticals rather than on their own. Scientific validation of indigenous medicinal plants is therefore important to increase their adoption in livestock health management. The knowledge of traditional healers, seasoned stockmen, hunters, and other experienced elderly people should be tapped to gather information on these practices so that it gets documented for the benefit of future generations.

Introduction

Animal health management poses a great challenge to livestock productivity in many developing countries. An estimated 80% of the populations of these countries depend on traditional medicines for primary health care; the same figure may also apply to livestock (Iqbal *et al.* 2003). While the conventional Western opinion of health only considers it to be the absence of disease (caused

by micro-organisms, chemical imbalance, nutritional deficiencies, pollution, etc.), the African culture considers the absence of both disease and intervention by evil spirits (Toyang *et al.* 2007). This cultural and religious perception of health is the basis upon which ethnoveterinary practices are applied, hence use of (1) natural products (medicinal plants and by-products), (2) appeals to spiritual forces (rituals, incarnations, and prayers), and (3) manipulation and surgery in traditional African healing practices (Toyang *et al.* 2007).

Ethnoveterinary medicine is the study of people's folk beliefs, knowledge, skills, methods, and practices on the part of those entities concerned with the healthcare of animals (McCorkle 1986, 1989). They include the use of medicinal plants, surgery techniques, and management practices for the prevention and treatment of livestock diseases. Ethnoveterinary practices also promote other indigenous

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knowledge systems such as production of indigenous livestock breeds and keeping of multiple species of animals to act as a buffer against climate extremes. Knowledge of the dynamics of their climate and the geographical range of pests and diseases help indigenous people in the prevention and management of disease. Traditional grazing management practices—such as stocking rate management and restrictions on watering animals in sacred water bodies or grazing livestock on sacred forests—are used as principles of veld and rangeland management. Droughts, floods, and related livestock problems are believed to be avoided by following traditional customs and beliefs such as rainmaking ceremonies.

Ethnoveterinary practices have their base in oral history that is often validated by applied experience of traditional stockmen and healers. Additionally, most of the drugs prescribed by traditional healers to treat humans are the ones also used to treat livestock diseases. While some of these practices are commonly known, having been tried and tested over time, others are relatively new. Owing to recent technological advancements, knowledge of more ethnoveterinary practices may now be acquired through literature search in journals, veterinary books, and media. However, due to the widespread adoption of Western veterinary drugs and medicines, the essence of ethnoveterinary practices has been adversely reduced. Given global socio-economic trends, climate change and variability, and increasing anthropogenic ecosystem degradation, this situation is likely to worsen. There are lots of untapped indigenous ethnoveterinary practices yet few studies on the potential of these practices in livestock production. Even though these practices have traditionally been used successfully, the efficacy of these traditional treatments is still open to question, hence it is important to carry out further research to validate farmers' claims (Nfi *et al.* 2001). Since both ethnoveterinary practices and Western science have their own strengths and limitations, the two should complement each other in addressing livestock health issues.

In disease prevention and treatment, most of the ethnoveterinary practices used are natural products, hence are threatened by the drivers of biodiversity loss such as habitat change, climate change, invasive species, over-exploitation, and nutrient loading. Droughts, hail storms, and other natural phenomena have also been upsetting ecological and economic balances, increasing biodiversity loss (Forster 2007, SCBD 2005). Modern medicines and ethnoveterinary practices can therefore complement each other to come up with the best strategies for climate change mitigation and adaptation (Adugna 1996).

Materials and Methods

Study site

This study was carried out in Masvingo Province which covers 56,566 km² of the southeastern part of Zimbabwe. Most of Masvingo falls within Natural Regions (NR) IV and V of the Zimbabwean ecological classification system (Vincent & Thomas 1961). The seven administrative districts of the province are Zaka, Bikita, Chivi, Masvingo, Gutu, Mwenezi, and Chiredzi.

Cattle, small ruminants, indigenous poultry, maize, and small grains are raised for subsistence in Masvingo Province. Chiredzi District, in which Hippo Valley and Mukwasine Estates are found, is the major center for sugar production in Zimbabwe. Mwenezi River provides irrigation water to the sugarcane plantations in and around Rutenga. The big rivers that flow through Zaka include Chivaka and Mushavhukwi, while the smaller ones include Mungwezi and Mananga. Irrigation is based on dams such as Bangala and Mabvute in Zaka and on Lake Mutirikwi in Masvingo District. Tourism also contributes immensely to the economy of the province. The Great Zimbabwe National Monument is one of the notable tourist attractions in Masvingo District. In Chiredzi, there is wildlife and tourism in Gonarezhou National Park and other conservancies. Ranching contributes greatly to the economy of Chivi and Mwenezi.

Data collection and analysis

Questionnaires were administered as the quantitative research tool to gather information on socio-demographic characteristics of the respondents, livestock ownership and flock dynamics, challenges in livestock nutrition, breeding, and health management, the use of ethnoveterinary practices, and challenges in livestock health.

The qualitative methodologies that complemented findings from the questionnaires were focus-group discussions and interviews done with extension officers from the departments of Livestock Production and Development (LPD), Agricultural Research and Extension (AGRITEX), Veterinary Services (DVS), Research and Specialist Services (DR&SS), non-governmental organizations (NGOs), traditional leaders, and other stakeholders. The respondents aged between 25 and 72 years were randomly chosen within each district to cover different experiences and knowledge in ethnoveterinary practices, sex, and livestock ownership.

Enumerators from different government departments were trained on how to implement the questionnaire on different types of people, with specific requirements such as translation of the questionnaire into vernacular or further clarification of the questions. A pre-test of the survey

was done to evaluate the questionnaire and modify it accordingly. During the actual field study, participants who showed a greater amount of knowledge of the topic during discussions were selected for further interviews. The Statistical Package for Social Sciences (SPSS) was used to analyze the data.

Results

Socio-demographic characteristics

The respondents ranged in age from 25 to 72 years with more females (61%) than males (Figure 1). Most of them had achieved a Zimbabwe Junior Certificate level education (Figure 2). Male-headed families were 53% of the respondents, with female headed, divorced, widowed, or single respondents together constituting the remaining 47%. The >60 years age group constituting the elderly had the fewest respondents, who, however, possessed the most knowledge on the traditional use of ethnoveterinary practices. The 41–50 years age group was the biggest

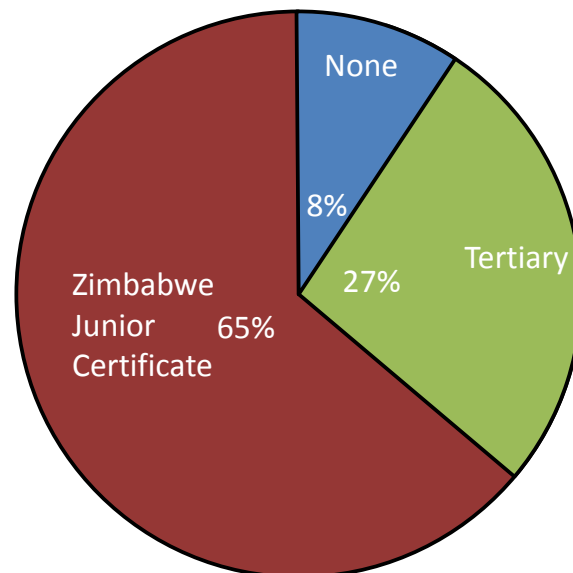


Figure 2. Level of formal education of respondents to questionnaires in Masvingo Province, Zimbabwe.

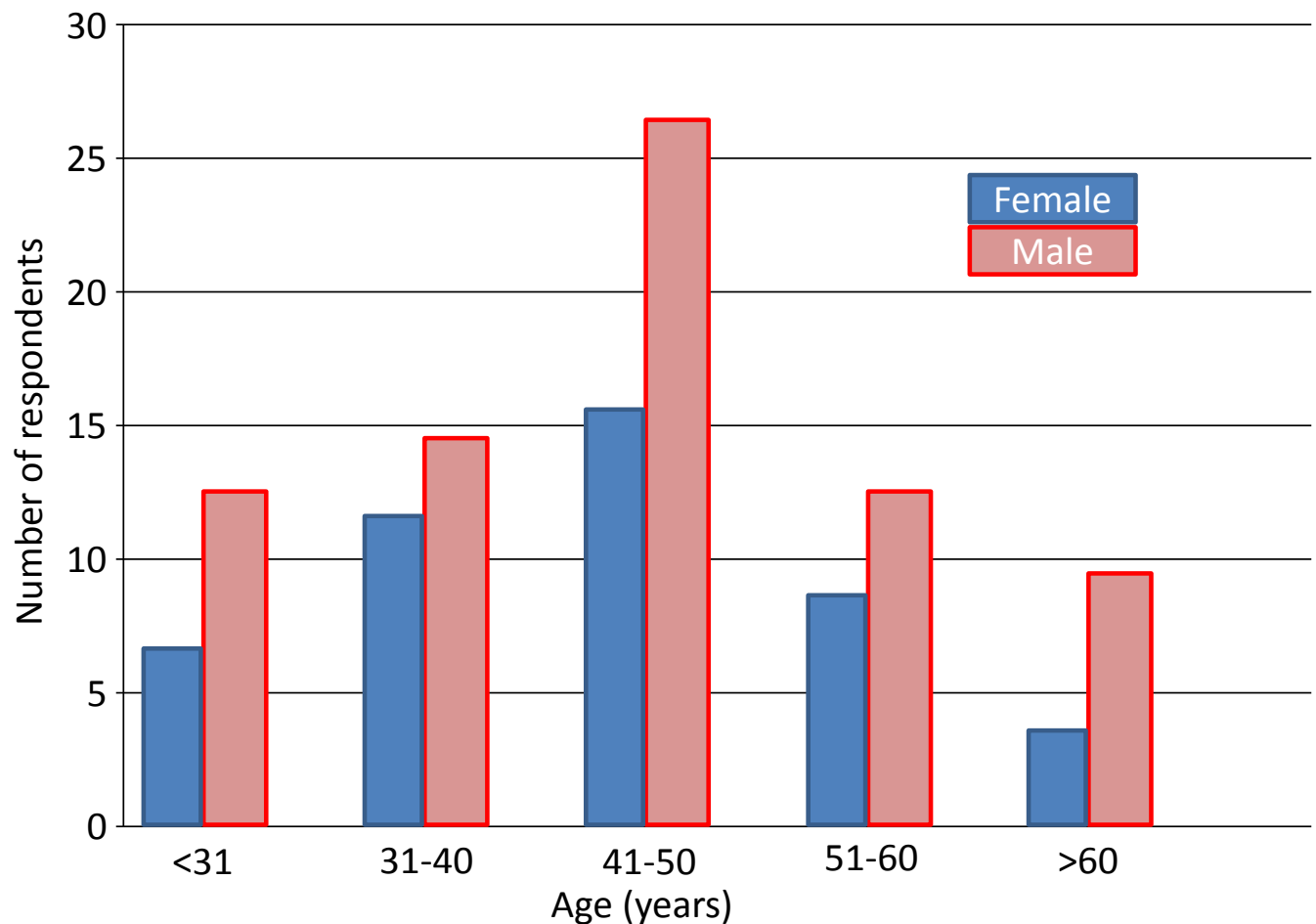


Figure 1. Age and gender distribution of respondents to questionnaires administered in Masvingo Province, Zimbabwe.

age group. It constituted the active livestock keepers who contributed much on the overview of livestock production in Masvingo Province, citing the challenges being faced, as well as the potential of ethnoveterinary practices. The younger respondents did not contribute much on the actual ethnoveterinary practices.

Challenges in livestock health management in Masvingo Province

The survey results revealed a number of challenges livestock farmers are faced with. These included deteriorating range conditions, shortage of water and supplementary feeds, lack of technical expertise, and animal health problems. All respondents cited high costs of veterinary medicines as a great hindrance to livestock health management. Inadequate disease diagnosis was noted as one of the challenges in the implementation of ethnoveterinary practices. Of the respondents interviewed, 78% could not identify most of the livestock diseases prevalent in their respective areas except for the most common ones such as black leg, coccidiosis, and new castle disease. Farmers also do not commit themselves to sending animals for post-mortem diagnosis, even though they understand its importance; only 35% of the respondents cited that they send their animals for post-mortem diagnosis. According to most of the respondents (88%), most clinical signs may be ignored in anticipation of self-healing. Farmers become alarmed by critical signs, a stage at which they normally start treatment, yet it may be too late.

Although ethnoveterinary practices were acknowledged as a possible alternative to conventional medicines, only 40% of the respondents indicated that they were using it in combination with the orthodox medicines. Use of pharmaceuticals was cited as the most common method of prevention and treatment of diseases. However, as much as 88% of the respondents said that they would give ethnoveterinary practices a try, though they were not willing to fully substitute pharmaceuticals with ethnoveterinary practices. In addition, some extension workers also showed reluctance in advising farmers or promoting the use of ethnoveterinary practices as this is not supported by government policies.

All respondents cited the inconveniences associated with formulating or using some traditional therapies as a challenge in adopting ethnoveterinary practices. They all acknowledged that one of the major problems regarding adoption of ethnoveterinary practices is little or no documentation of either the plants used in addressing livestock health and production or the forms in which they are applied. There is also lack of adequate scientific evaluation on those practices. Poor road, telephone, and other communication networks were cited by 76% of the respondents as a challenge, especially in remote areas. Cultural heterogeneity was also noted to be one of the causes of

non-adoption of ethnoveterinary practices by 84% of the respondents.

Discussion

Socio-demographic characteristics

The >60 years age group constituting the elderly can use its experience to influence the modern generation to adopt ethnoveterinary practices and also provide information for documentation. The 41–50 years age group with the highest number of respondents had some information passed down orally to them from their forefathers. These are people who can also contribute to promoting uptake of ethnoveterinary practices as they experience the advantages of using these practices as alternatives to conventional drugs. Although the younger respondents did not have much knowledge on the actual ethnoveterinary practices, they could relate the need for the existing government structures, policy developers, and stakeholders in livestock production to form partnerships in addressing the current situation in livestock health management in Masvingo Province.

Overview of livestock production in Masvingo Province

Livestock production is a vital part of the culture of the people of Masvingo Province. The different types of livestock include cattle, sheep, goats, pigs, and poultry. Cattle are a source of income, meat, milk, draft power, and manure for crop production. They can be used as collateral and are a measure of wealth. Small ruminants and poultry, which are easily disposable, are mainly kept as a source of income and for meat. The main challenges faced by livestock producers in Masvingo include deteriorating range conditions, shortage of water and supplementary feeds, lack of technical expertise, and animal health problems. Imported orthodox medicines are often very expensive and unavailable to most resource-poor rural farmers, leading to failure to address animal health effectively. This may result in reduced quality and productivity and even mortalities.

Challenges in livestock health management in Masvingo Province

The problem of high costs of veterinary medicines is exacerbated by the fact that government veterinary services no longer have the capacity to supply veterinary drugs; farmers now have to rely on veterinary drug distributors, who in most cases are located very far from farms in the central business district. This attracts an additional transport cost. The required drugs may also not be available at the critical time. Even if available, some of the small-scale farmers cannot afford the drugs, especially vaccinations that may be packaged in bulk. Usually, they have to organize themselves into groups so that they contribute

individually towards the cost of such vaccinations. This delays treatment of diseases and may cause mortalities. The state of government animal healthcare facilities in the province, such as dip tanks, is also declining. In most cases, it is now up to the locals to maintain such facilities in their communities. Village heads or other traditional leaders together with extension workers may assume the supervisory role in carrying out these activities in their areas of jurisdiction. However, as with most common pool resources, this presents a social dilemma (Adams *et al.* 2003).

Poor road, telephone, and other communication networks affect information dissemination, especially in remote areas. Farmers need current updates on new and sustainable technologies, optional drugs available in local markets, and adaptive and mitigatory measures to the challenges of climate change and variability with respect to animal health management. Critical information such as outbreaks of notifiable diseases should reach farmers early for preventative strategies to be employed. However, in most remote areas there are poor networks for communication, either by road or phone. Extension workers also do not have vehicles to access farms and offer services required by livestock producers. Their contact with farmers is mainly limited to irregular meetings held with farmers. Therefore, some extension workers have resorted to using political or church meetings, funerals, and any other such gatherings as opportunities to address livestock production issues.

Inadequate disease diagnosis by farmers is one of the major factors contributing to livestock mortalities. Where veterinary officers may not be available soon enough to diagnose diseases and give recommendations, animals may actually die. Even though farmers could list the general signs of both good health and ill health, common clinical signs like diarrhea, weight loss, appetite loss, restlessness, and nervousness may be caused by a variety of other factors. There would therefore be need for proper diagnosis. It was also noted that names for the same disease would vary from area to area. However, in most cases a combination of detailed descriptions of the signs and symptoms observed and the assumed causative agents helped in identifying the diseases or, in the least, categorize them. Generally, there seemed to be little variation in the livestock diseases common to all seven provincial districts.

Although ethnoveterinary practices were acknowledged as a possible alternative to conventional medicines, there are challenges associated with adopting these practices. Indigenous knowledge systems have traditionally been passed from generation to generation orally; hence people possess little or no knowledge of invaluable practices such as ethnoveterinary medicine. Unlike conventional medicines, whose use is authorized after extensive laboratory research, ethnoveterinary medicines depend only

on historical evidence of use as proof of safety and effectiveness. Also, unlike pharmaceuticals, the dosages and side effects of most ethnoveterinary medicines are not known, hence it is important to identify the correct plant to use as different plant species may have the same local name.

Preparing mixtures may be time-consuming to the detriment of animals. Additionally, a concoction may be deemed ready upon visual assessment—having reached a certain stage of fermentation, attained a particular color change, or having started to exude a certain smell. It may also be necessary to know of seasonal changes in flowering, blossom peaks, and when plants yield their highest healing potential (Toyang *et al.* 2007). Depending on the disease to be treated, the plant parts that can be used include the leaves, stems, flowers, fruits, seeds, and bark. Plant species occurrence can also be influenced by topography and soil type. The active ingredient in the plant may be dependent on the plant part, stage of growth, time and season of harvest, method of handling during collection, and storage (Toyang *et al.* 2007). All this may require experts to validate appropriateness and readiness for application. Experienced stockmen or traditional healers may be the only ones with appropriate information regarding, for instance, the forms in which the drug has to be given for a particular disease. Herbal medicines may be boiled, soaked, or used in the powder form, as paste, or extract. These different forms also determine the application method of the medicines. For instance, medicines may be incorporated into feed or water, smeared on the skin, or given by drenching. They can also be inserted into the fecal orifice, eyes, or birth canal. Therefore, without such information ethnoveterinary practices are adopted with less reliance and confidence.

Additionally, even though good harvesting and post-harvest storage techniques may be a solution to the problem of seasonal availability of some plants, processed ingredients may differ chemically from freshly collected plant parts, leading to overdosage or underdosage (Toyang *et al.* 2007). Appropriate rates of application of a medicine may also depend on stage of disease. Overdosage can be detrimental to animals while underdosage may also cause resistance and, like overdosage, lower livestock production.

Cultural heterogeneity was cited as one of the causes of non-adoption of ethnoveterinary practices. Modern generations uphold the Western culture and hence look down upon local and indigenous knowledge systems. This may result in loss and distortion of traditional information concerning ethnobotany, especially since many healers possessing this information are elderly and lack successors; as they die, their knowledge dies with them (Cox & Balick 1994).

In addition to the survey findings, some of the challenges to ethnoveterinary practices are socio-economic factors such as population pressure. The human population is expected to reach 10 billion by the end of this century (EDF 2010). Consequently, agricultural expansion into tropical and sub-tropical forests, grasslands, and savannas, especially of Saharan Africa, and other stress on the land may cause unsustainable consumption. Total consumption has increased in this century, and it is projected to remain so due to demographic change and economic growth (SCBD 2010). Lack of involvement of the scientific community in validation of ethnobotany in livestock health management means that there is limited research work and output dissemination. Also, there has not been adequate funding appropriated toward development of facilities and programs to undertake ethnoveterinary research, development, and extension (ERD & E). The political instability of countries, especially developing ones in Africa, leads to low political and financial priorities accorded to conservation, resulting in the growing instability of the state to protect biodiversity such as indigenous plants (Matose 2002). Financial aid meant for biodiversity conservation in such countries may be channelled toward war politics-related activities. Other legal impediments such as lack of appropriate policies and laws to deal with protecting biodiversity (SCBD 2010) also affect ERD & E.

Potential of adoption of ethnoveterinary practices

Biodiversity is the variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems, the ecological complexes of which they are part, including within-species, between-species, and of ecosystems (Izaguirre 2008). Ethnoveterinary medicines and other such practices are part of biodiversity. Livestock producers in Masvingo Province value biodiversity as a global asset and appreciate its significance in their livelihoods. Therefore, with the understanding that promoting ethnoveterinary practices offer locally available, simple, and effective solutions to address livestock health challenges, cultivation, processing and usage of ethnoveterinary practices should not present challenges. Sustainability can be achieved to pursue economic prosperity, environmental quality, and social equity (Hasna 2007).

Compared to pharmaceuticals, ethnoveterinary medicines are affordable and sustainable as they are readily available to farmers. This study has shown that farmers use plants that occur in their different districts of the province. There is need to further research the medicinal properties of these plants based on their traditional uses in livestock production. The most promising plants should be scientifically validated through systematic experiments using, for instance, indicator helminths in laboratory toxicity studies and, if these are positive, screening in domestic animals (Hammond *et al.* 1997, Sulaiman *et al.* 2011a, Sulaiman *et al.* 2011b). McCorkle (1995) suggests that since

they do not contain fixatives, preservatives, hormones, or such substances, herbal plants are presumably more biodegradable and lead to less bioaccumulation in patients' bodies and the environment.

Whereas ethnoveterinary practices have been associated with the resource-poor in the past, in the face of climate change and variability the practices may once more increase in adoption. Increases in the incidence of resistance to the commonly used pharmaceuticals, notably acaricides, and the occurrence of new disease-causing agents might be attributed to the shift in the geographical range of pests and diseases due to climate change and variability. Furthermore, the processes of manufacture and use of most pharmaceuticals pose environmental health challenges through unsafe disposal methods and release of harmful gases and other by-products directly into the atmosphere, soil, or water bodies. In the global effort to reduce greenhouse gas emissions, ethnoveterinary practices are alternatives to such industries and would be welcome intervention strategies.

Ethnoveterinary practices have been shown to be more common in certain livestock health problems. They are more appropriate for wounds, reproductive disorders, internal and external parasites, and digestive and reproductive disorders than respiratory, infectious, and epidemic diseases which are best prevented by using conventional vaccines. Adoption of ethnoveterinary practices for health problems that they have been shown to be very effective on, should be promoted to increase reliance, hence adoption.

Promoting the use of indigenous medicinal plants in livestock health management can also help create employment opportunities not only for the scientists but also for the youth, women, children, and other rural folk not formally employed. Adoption of ethnoveterinary practices also helps to conserve biodiversity, ensuring achievement of the Millennium Development Goals (MDGs) relating to poverty, health, and the environment. ERD & E is an effective way of gathering ethnoveterinary practices. McCorkle (1995) defines ERD&E as the holistic, interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners, and social structures pertaining to the health care and healthful husbandry of food-, work-, and other income-producing animals, always with an eye to practical development applications within livestock production and livelihood systems, and with the ultimate goal of increasing human well-being via increased benefits from stock raising.

Incorporation of ethnoveterinary practices into government policies can be accomplished through promoting the community-based resource management systems of the locals. The bottom-up, people-driven, and comprehensive approach to the designing of rules improves the ability of citizens to partake in the transformation of the evolving

instruments of governance (Folke *et al.* 2002). This process helps to build trust and confidence of the people in their government and in public institutions. It also greatly increases the chance that society will consider the institutions so developed to be rightful tools for biodiversity management (Chiesa *et al.* 2009). However, most policies are made at a state level, presenting institutional and technical weaknesses that do not reflect and address the needs of the majority.

How to promote ethnoveterinary practices in Masvingo Province

There is a lot of untapped information on ethnoveterinary practices in Masvingo Province. Historians and other researchers can use quantitative and qualitative methods to gather this invaluable knowledge of the ethnoveterinary plants and practices that the elderly, traditional healers, seasoned stockmen, and hunters in these communities have. They can also use literature review to collect information on ethnoveterinary practices which have been tested and widely used in human or veterinary medicine in areas of similar agro-climatic conditions to Masvingo Province. Databases created can be documented for reference by present and future generations, preventing loss of information.

The elders have an important task of educating younger generations on how they successfully used ethnoveterinary practices in livestock health management practices traditionally. This will help the modern generations to appreciate these practices, have confidence in using them, and thus adopt them without ridicule such as is experienced presently.

Most indigenous medicinal plant species are harvested in the wild where they are at risk of overharvesting. Mainstreaming and integration of ethnoveterinary practice issues into sectors such as the Environmental Management Agency (EMA) will help identify potential destruction to biodiversity through using tools such as environmental impact assessments (EIAs). Preventive strategies can be recommended, and anyone arrested by police for not abiding by set rules of biodiversity management will have hefty penalties imposed on them by local authorities such as chiefs, rural district councils, and other justice systems. This will help prevent destruction and consequently extinction of medicinal plants, thus ensuring their availability for sustainable use in ethnoveterinary practices in the province.

Multi-disciplinary education and training is key to the adoption of ecological production approaches. Curriculum developers in the education system should ensure that schools and colleges, veterinary, and other agricultural curricula should comprise training on both conventional and ethnoveterinary practices. This is important in

empowering scholars on the skills and knowledge needed in implementing ethnoveterinary practices in the future as they take on different roles in livestock production.

Government departments are the primary service providers in small scale livestock production systems. To promote ethnoveterinary practices in Masvingo Province, for instance, extension programs should include awareness on the potential of ethnoveterinary medicines as locally available and affordable alternatives. Extension workers should also apply these medicines when they attend to farmers' animals as demonstrations. Government research institutes should be mandated to scientifically validate these ethnoveterinary practices so that information on preparation methods, dosages, and possible side effects will be available to the general public. This will promote adoption of ethnoveterinary practices.

There is also need for plant specialists to carry out *ex situ* and *in situ* studies in order to update plant species taxonomies. Vegetation is affected by climate change and variability, hence the need to have accurate records of the medicinal plants that are actually found in Masvingo Province among those recorded as having been traditionally used in ethnoveterinary practices. Used in conjunction with scientifically proven medicinal plants, this database will provide a guideline that can be used to promote ethnoveterinary practices.

Due to the services they provide, medicinal plants are at risk of overconsumption. Therefore, protected areas can be established to protect them. Alternatively, they can be collected to form a gene bank. Characterization and evaluation of the agronomic characteristics of such species for propagation will help to domesticate them to prevent risk of extinction. They will therefore be readily available for use in ethnoveterinary practices.

Capacity-building programs used in biodiversity management programs are more focused on higher levels, ward committees, and project officials than on traditional leaders and local residents. Subsistence farmers should be capacitated through ethnobotany research-based interventions, and skills development programs should be used to enhance participation in the implementation of biodiversity programs.

Zimbabwe, like most developing African countries, lacks the monetary resources and technology to adequately promote ethnoveterinary practices. In Masvingo Province, just like at the national level, there is need to integrate biodiversity concerns into development assistance frameworks and related policies and strategies. There have not been incentives for biodiversity conservation or sustainable management. This is actually one of the tools to ensure effectiveness in institutions dealing with management of natural resources such as ethnoveterinary plants.

Incentives help to reduce obstacles of development that are manifestations of poor, inappropriate, and weak institutions and perverse incentives (Olson 1996). They will also help promote uptake of ethnoveterinary practices.

Increase in adoption of ethnoveterinary practices in Masvingo Province will come through greater coherence and synergies among sectoral responses. Local cultural and livelihood needs must be considered along with conservation goals. Ethnoveterinary plants are part of the variety of forms that biodiversity takes that includes indigenous reserves, community-managed ecosystems, managed landscapes, sacred forests and springs, partnership areas, and many privately or NGO protected lands, hence the need for partnerships. All such stakeholders in the province should therefore come together in their different capacities to form partnerships that promote use of ethnoveterinary practices. The use of participatory appraisals of problems and solutions, collaborative management, and participatory monitoring/evaluation schemes are effective ways of integrating community members' interest and involvement and thus generating long-term support to biodiversity conservation projects (Scialabba & Williamson 2004), which also benefits and promotes use of ethnoveterinary practices.

Lastly, if there is transparent benefit-sharing in all forms of recompense for the use of genetic resources (including natural products), whether fiscal or non-fiscal, this can increase stakeholder participation in scientific research and development on resources such as indigenous plants. Benefit-sharing includes availing the findings of such scientific research and development and the transfer of technologies (Girsberger *et al.* 1999). Bioprospecting or collection of natural products has to be allowed by the biodiversity-rich country in exchange for a share of the benefits. The CBD objectives imply a prior informed consent between the source country and the collector, to establish which resource will be used and for what and to settle on a fair agreement on benefit-sharing (SCBD 2005). The knowledge of the people of Masvingo Province should be protected against bio-piracy as a result of intellectual property rights being claimed.

Conclusion

Livestock production is faced with various challenges that include health management. Conventional methods of disease prevention and treatment are expensive for most resource-poor farmers. However, ethnoveterinary practices are alternative methods which are not fully appreciated. There is little documentation of these practices, hence they are not widely known. Application rates, forms, and side effects of indigenous plants not scientifically validated are also not clearly stated for safe use. Adoption of ethnoveterinary practices would be most appropriately accomplished through promoting the community-based

resource-management systems of indigenous people. Awareness and informative programs using the bottom-up approach creates participatory platforms that can help incorporate such practices into livestock health management programs, education policies, and curricula. Appreciating the knowledge that the locals have by sharing their experiences and tradition increases their confidence in applying their traditional knowledge and imparting the knowledge to others. This of course does not mean that traditional medicine should overtake Western medicine, but rather that we may benefit from a harmonious balance of both.

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