Use of ethno-veterinary medicine for the control of cattle parasites by smallholder farmers in Mutasa District, Zimbabwe

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Abstract

The study was carried out in Mutasa district of Manicaland province in Zimbabwe to identify the herbs used to control cattle parasites and to determine the extent of the usage of herbs among smallholder farmers. Multi-stage random sampling procedure was used to select 70 smallholder farmers to which structured questionnaires were randomly administered. Statistical Package for the Social Science (SPSS, 1999) was used for data computation. Common herbs used were *Dryopteris marginaris* (fern) (5.8 %), which was used specifically to control tapeworms, *Artemissia absintbium* (wormwood) (13.0 %), *Aloe chabaudii* (gavakava) (11.6 %) and *Utica dioica* (nettle) (13 %) for the control of internal parasites. *Tephrosia vogoelii* (mutika) (1.4 %), *Ricinus communis* (Mupfuta) (4.3 %) and *Zingiber offiale* (wild ginger) (4.3 %) were used to control external parasites particularly ticks and flies. There was an association between farmers' religion and extensive use of herbs (χ^2 =11.769; $P < 0.05$), and between the relationship of respondent to the household head and extensive use of herbs (χ^2 = 19.545; $P < 0.05$). Training in agriculture should include aspects on herbal use and, conservation and preservation methods to ensure continuity of the available medicinal plants and the sustainability of using ethno-veterinary medicine by the smallholder cattle producing farmers.

Key words: cattle, ethno-veterinary medicine, parasites, smallholder

Introduction

Cattle are of paramount importance in the smallholder setup. They are a source of high-quality animal protein, but equally important, cattle are a source of manure, draft power, symbol of status and income for the majority of smallholder farmers in developing countries. Cattle have, therefore, become a way and reason of living to smallholder farmers in Zimbabwe (Gregson, 1973). However, cattle productivity in the smallholder sector is hampered by parasite infestation. The complex of both endo- and exoparasites directly or indirectly constrains the growth of cattle herd, which is of fundamental importance to the smallholder farmers in sustaining food security and income. Parasites are responsible for an array of losses, caused by direct effect of attachment, the injection of toxins or through morbidity and mortality associated with the diseases that they transmit. They cause tick worry which damages the skin thereby reducing hide quality. Exoparasites, particularly ticks, cause anaemia (Morris, 1995). These can also transmit tick-borne diseases such as Babesiosis, Theilerosis, and Anaplasmosis. Parasites are developing resistance to most conventional de-worming remedies causing farmers to depend on traditional methods of controlling endo-parasites (Nunnery, 1953).

Cattle producers wrestle with sharply increasing costs and the ensuing unavailability of expensive synthetic drugs. Consequently, the majority of smallholder cattle producers are resorting to the use of ethno-veterinary medicine (EVM) to control cattle parasites. Ethno-veterinary medicine is the scientific term for traditional animal health care that encompasses the knowledge, skills, methods, and beliefs about animal health care found among the members of the community (McCorkle, 1996). It has been developed through trial and error and deliberate experimentation over generations. Therefore, it is less formalized and not universally recognized as a valid method of controlling parasites (Mwale et al., 2006). However, the use of ethno-veterinary medicine is not well documented. Thus, scientific evaluation and verification of the pharmacological properties of the locally available and useful herbs could improve access to affordable remedies by resource-poor farmers, thereby improving cattle health status and productivity. The supply of veterinary health service and medications is constrained by the scarcity, erratic supply and prohibitive costs of synthetic drugs.

Conventional drugs misuse and death of cattle begin to surface leading to shortage of draft power, milk, meat and income. Although an expansive network of veterinary hospitals exists, poor communication, poor infrastructure and shortage of manpower drives cattle owners to treat animals themselves, consult herbalists, or slaughter the animal if the cost of treatment becomes unaffordable. In view of these constraints, identification and determination of the extent of use of ethno-veterinary medicine as critical alternative and complementary means of controlling cattle parasites in the smallholder farming systems of Zimbabwe is of paramount importance.

Methodology

The Study Site

The study was carried out in Mutasa district in Manicaland Province of Zimbabwe. The area is mountainous with rugged terrain and soils ranging from sand soils to red clay loam. The altitude is 1954 m above sea level and the area is in agro-ecological region 11b. Temperatures in summer are warm ranging from 18 to 22 °C and in winter they range from 16 to 18 °C. Rainfall received within the district ranges from 700 to 1000 mm per annum. Mid-season droughts or dry spells occasionally occur between January and February. Cattle are kept for milk, draft power, meat, socio-cultural and income generation purposes. Natural grazing is the primary source of feed for cattle, but cereal crop residues and planted pastures are used for short periods.

Sampling technique

Multi-stage random sampling procedure was used for the selection of participants in the study. Seven wards were randomly selected in the district and within each ward ten smallholder farmers were randomly selected.

Data collection

The data was collected using structured questionnaires. The questionnaires were randomly administered to ten households in each of the seven wards of the district. The following information was collected; household demography, cattle productivity, knowledge of cattle parasites and the diseases they cause, cattle health management, the farmers' perceptions on the use of ethno-veterinary medicine to control cattle parasites; preparation, application, and extent of using traditional medicine for the control of cattle parasites.

Data analysis

Results

The Statistical Package for the Social Sciences (SPSS, 1999) was used to compute frequencies, chi-square values, correlation and cross-tabulations. The chi-square was computed to determine the association between the extensive use of herbs and religion, level of education attained, age of head of household, gender of the head of household, and the relationship of the respondent to the household head. Pearson's correlation was computed to ascertain the association between the age and level of education of the head of household and the extent of using herbs.

Household Demography

The majority of the head of households were males constituting 76.8 % while 32.2 % of the households were female headed. The ages of heads of households were 21 to 40 years (14.5 %), 41 to 60 years (50.7 %) and above 60 years (34.8 %). About 75.4 % of the farmers were married, 21.7 % were widowed while 1.4 % were divorced. Most of the farmers were Christians (59.4 %). The least education level attained was standard six (5.8 %) while most farmers achieved Ordinary level ('O' level) (60.9 %). A few of the farmers attained tertiary education (18.8 %) while 14.8 % attained Zimbabwe Junior Certificate (ZJC) The farmers that were trained in agriculture constituted 20.3 % while 78.3 % had no training.

Common parasites

The most common external parasites known by farmers were ticks (97.1 %) while hoovers were least known (1.4 %). The research indicated that roundworms were the most commonly known endo-parasites (92.8 %) while hookworms were least known (2.9 %) as shown in Table 1. Farmers reported that they perceived use of herbs as valuable, convenient, reliable and cheap remedy sources, alternative to unavailable and expensive conventional drugs. Farmer-to-farmer variations in the use of a particular herb, and unavailability of some herbs in some seasons during the year were reported as disadvantages of herbal use.

Table 1: Percentage of farmers aware of common cattle parasites

Parasite	Awareness (%)
Endo-parasites	
Roundworms	92.8
Wireworms	39.1
Hookworms	2.9
Tapeworms	27.5
Liver flukes	43.5
Conical flukes	10.1
Exo-parasites	
Ticks	97.1
Mange	14.5
Blow flies	17.4
Hoover	1.4
Tsetse flies	13.0

Herbs used for controlling cattle parasites

The findings of the used herbs' preparation and application method for the control of internal parasites are shown in Table 2., while herbs used in the control of external parasites are shown in Table 3. The smallholder farmers used about three types of herbs to control endo-parasites.

Extent of herbal plant use

The farmers who believe in traditional religion (84 %) extensively used the herbs whilst 16 % did not extensively use the herbs. Among the Christians, 64 % widely used herbs and 36 % did not. The majority of the smallholder farmers who attained standard six used herbs expansively (100 %), while 80 % of the farmers who attained tertiary education commonly used herbs. About 74 % of the respondents who completed 'O' level used herbs more intensely than those who did not complete 'O' level. Sixty-seven percent of the farmers trained in agriculture used herbs in controlling cattle parasites.

The age of head of household between 21 to 40 years (78 %) widely used herbs and 33 % did not, whilst the age group above 60 years had 88 % of the farmers extensively using the herbs. Divorced farmers (100%) used herbs more than married (75 %) and widowed (70 %) farmers. The majority of males (76 %) used herbs compared with females (70 %).

Table 2: Commonly used herbs and the proportion of farmers using each herb for control of endopararites.

Herb	Part of the plant	Preparation method	Application method	Farmers using herbs (%)
Canlopyllum thalictroides (Blue cohosh)	Leaves	Put I teaspoon of dried herb in a cup and poured boiled water over the mixture and wait for 15-20minutes.	Drench the animal using a bottle.	4.3
Archilea millefolian (Yarrow)	Leaves	Put I teaspoon of dried herb in a cup and poured boiled water over the mixture and wait for 15-20minutes.	Drench the animal	2.9
Allium sativa (Garlic)	Bulb	Grind the bulb	Mix with feed and offer animals.	1.4
Tanacetum vulgare (Tansy)	Leaves	Soak 1 teaspoon of dried herb into a cup of boiled water for 15-20 minutes.		
Ruta gaveolens (Rue)	Leaves	Soak 1 teaspoon of dried herb into a cup of boiled water for 15-20 minutes.	Drench the animal.	2.9
Dryopteris marginalis (Fern)	Leaves	Soak 1 teaspoon of dried herb into a cup of boiled water for 15-20 minutes.	Drench the animal.	1.4
Aloe chabaudii (Gavakava)	Plant juice	Crush the leaves and soak in water.	Drench the animal	5.8
Artemisia absintbium (Wormwood)	Leaves	Soak five leaves in a cup of boiled water for 15-20 minutes.	Sieve and drench the animal	11.6
Nasturtium trapaeolum	Seeds	Grind the seeds	Drench the animal.	13.0
	Leaves	Soak the leaves in boiled water.	Mix with feed and feed animal.	4.3
Foemculum vulgare (Fennel)	Leaves	Put I teaspoon of dried herb in a cup and poured boiled water.	Drench the animal	8.7
Urtica dioica (Nettle)	Leaves	Put I teaspoon of dried herb in a cup and poured boiled water.	Drench the animal	13.0
Nicotiana tabacum (Tobacco)	Leaves	Grind into small pieces	Mix with feed and feed animal.	5.8
Strychnos cocculoides (Mutamba)	Fruit	Break hard coat of half ripen and soak in water.	Sieve and drench the animal.	1.4
Diplorhynchus condylocarpon (Mutova)	Roots	Cut the roots into pieces using 1 teaspoon of dried and simmer for 10-15 minutes in non-metal pan.	Drench the animal.	4.3
Afzelia quanzenis (Pod mahogany)	Bark	Cut the bark into pieces measure 1teaspoon dried or 3-teaspoon fresh material and simmer for 10-15minute.	Drench the animal	1.4
Adenosia digitata(Baobab)	Bark	Cut the bark into pieces measure 1teaspoon dried or 3-teaspoon fresh material and simmer for 10-15minute.	Drench the animal	1.4
Cordyla African (Wild mango)	Bark	Cut the bark into pieces measure 1teaspoon dried or 3-teaspoon fresh material and simmer for 10-15minute.	Drench the animal	1.4
Uapaca kirkiana (Muzhange)	Bark	Cut into pieces and measure 1 teaspoon dried herb and simmer for 10-15 minutes.	Drench the animal	1.4

There was an association between farmers' level of education and the extensive use of herbs ($\chi^2 = 11.769$; $P < 0.05$). However, there was no association between farmers' training in agriculture and extensive use of herbs ($\chi^2 = 1.600$; $P > 0.05$). Similarly, there was no relationship between age of household head and extensive use of herbs ($\chi^2 = 6.254$; $P > 0.05$), and farmers' marital status and extensive use of herbs ($\chi^2 = 7.059$; $P > 0.05$). However, there was an association between relationship of the respondent to the household head and the extent to which herbs were used ($\chi^2 = 19.545$; $P < 0.05$). There was a negative correlation between the age of the head of household and the level of education attained by the farmer corresponding to the extensive use of herbs ($r=-0.257$; $P<0.05$).

Table 3: Commonly used herbs and the proportion of farmers using each herb for control of exopararites

Herb	Part of the plant	Preparation method	Application method	Farmers using herbs (%)
Zingiber officinale (Wild ginger)	Leaves	Soak 1 teaspoon of dried herb into a cup of boiled water and wait for 15-20 minutes.	Spray affected part	4.3
Tephrosia vogoelii (Mutika)	Leaves	Crush the leaves and soak in water.	Use a spray.	1.4
Ricinus communis (Mupfuta)	Seeds	Roast, grind and make thin porridge.	Smear on affected part.	4.3

Discussion

A wide range of herbs are used by smallholder farmers in Mutasa district. This is in agreement with the findings of Gueye (2002) who reported that resource-poor farmers, particularly women widely use EVM. This indicates that EVM is of explicit value to smallholder farmers in Mutasa District and may play a significant role in cattle disease control strategies. Considering that commercial drugs are expensive and unaffordable to most smallholder farmers and that parasites were prevalent in the area, farmers were left with no choice but to rely on traditional medicines. The findings that the herbs were perceived as valuable, convenient, reliable and cheap remedy resources, alternative to conventional remedies is concurrent with the findings of Otto (1997) who reported that ethno-veterinary medicine is cheaply available, readily available, accessible and locally available. This enables farmers to make use of their resources and realize their value thereby enhancing conservation of the valuable natural resources, leading to sustainability of both the natural resources and cattle production enterprises (Mwale et al, 2006). Gueye (2002) supported the fact that natural products, especially plant products that are locally available, are generally used. However, he went on to elaborate that although the smallholder farmers claim that these practices are effective, there is an urgent need for applied research to substantiate their findings. Thus, herbal use has a positive impact in communities that have limited access to conventional animal health care, due to socio-cultural and economic factors.

The majority of the farmers were males indicating that most households were male headed. This is in concurrence with Chimonyo et al., (1999) who reported that the majority of the smallholder farmers' households are male-headed. However, with this study heading of family had no effect on decision-making pertaining to traditional medicinal use for the control of cattle diseases and parasites. This shows that there were no limitations in decisions pertaining to traditional medicinal use in relation to cattle diseases and parasites control. This is supported by the fact that even children are capable of using herbs and that the knowledge is passed on from generation to generation (Mwale et al., 2005). There was an

association between the relationship of the respondent to head of household and the extensive use of herbs because the directives come from the head of the family or the owner of cattle. If someone is not closely related s/he is incapable of influencing the household head in decision-making aspects particularly on the treatment and control of cattle parasites.

The age group of between 41to 60 years had the highest percentage of respondents because most middle-aged farmers are joining the agriculture industry. Farmers trained in agriculture were few due to the fact that farming was inherited from forefathers and probably children learnt from their parents. There was no association between agriculture training and use of herbs because knowledge is passed on from generation to generation (Mathias, 1996). The findings of no association between agriculture training and extensive use of herbs are also supported by Mwale et al., (2005) who stated that there is little documentation on the use of ethno-veterinary medicine, as many researchers and health practitioners view these practices as backward. However, training in agriculture should include aspects on herbal use to enhance documentation of ethno-veterinary medicine use in the smallholder farming systems for farmers to reliably benefit from their valuable resources. On the other hand, farmers not trained in agriculture extensively use the herbs than trained ones because most of them did not have capital to buy synthetic drugs and some do not know the side effects of using these herbs (MacInnis, 1976). However, the issue of the side effects of herbs needs to be researched on thoroughly and addressed in order to provide appropriate advice to farmers.

Most known herbs for the control of external parasites, were particularly for the control of ticks, as they were most prevalent in the area. Of the endo-parasites reported by farmers, roundworms were dominant in the area because the veterinary officers did most post mortems in the presence of farmers who then received valuable information on roundworms. *A. absintbium* (Wormwood) and *Utica dioica* (nettle) were used extensively to control internal parasites because cattle were heavily infested with roundworms and the herbs were the most common in the district and easily and readily available. The use of *A. absintbium* is in agreement with Mathias (1996) who suggested the following recipe for dewormer balls: four teaspoons of cayenne pepper powder, two teaspoons of powdered common wormwood mixed with honey and flour. However, the preparation for use is parallel with the method farmers used in which they simply soaked wormwood leaves in water for 15-20 minutes before dosing the animals. They used a simple method because they did not have money to buy flour. *A. chabaudii* was used extensively to control internal parasites because it is locally available in mountainous areas.

The majority of the farmers used herbs despite the fact that most of them were Christians. This could be attributed to the scarcity and prohibitive prices of the conventional drugs in Zimbabwe. Farmers who had tertiary education used the herbs extensively because they have the opportunity to source information on the use of herbs from various stakeholders. The age of head of household had no association with the extensive use of herbs indicating that age is not a limiting factor in employing ethno-veterinary medicine as reported by Mwale et al. (2005). This also indicates that all age groups may be equally informed about the use of herbs, as the information is mostly passed on from generation to generation. A negative correlation between age and level of education of the farmers who widely used herbs is an indication that the older the farmers were the less educated they were though broadly using herbs.

Some herbal plants were used to treat more than one parasite, while others were used as mixtures. This is because herbalists in the same geological area often cite different herbal treatments for the same parasites and variations are often encountered in the method of preparation and dosing (Curry, 1998). Other limitations of ethno-veterinary medicine included the unavailability of some plant species at certain times of the year, the inadequacy of traditional means of parasite detection and knowledge of conserving the herbs. Appropriate methods of conserving herbs to assure their availability all year round, therefore, need to be validated. Although, the findings showed that the forefathers informally taught generations about the herbs, justification stands for the standardization of the information on ethno-veterinary medicine, thereby encouraging sustainability and conservation of the natural resources (Wanyama, 1997).

Conclusion

Most farmers in Mutasa district rely on traditional health practices for health management of their cattle. The smallholder farmers used a wide range of traditional herbs to control cattle parasites, and they extensively used most of the herbs especially the middle-aged farmers, traditional religion followers and male heads of households. Herbal plants used included *D. marginaris*, which was used specifically to control tapeworms, *A. absintbium*, *A. chabaudii* and *U. dioica* for the control of internal parasites. *T. vogoelii*, *R. communis* and *Z. offiale* were used to control external parasites particularly ticks and flies. Training in agriculture should include aspects on herbal use, dosage rates and preservation methods to

ensure continuity of the availability of effective medicinal plants and the sustainability of using ethno-veterinary medicine by the smallholder cattle producing farmers.

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