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Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward

W Wanzala^{a e*}, K H Zessin^b, N M Kyule^{c,b}, M P O Baumann^b, E Mathias^d and A Hassanali^a

^a*International Centre of Insect Physiology and Ecology, ICIPE, Behavioural and Chemical Ecology Department, BCED, P.O. Box 30772 -00100 GPO, Nairobi, Kenya*

^b*Department of International Animal Health, Freie University Berlin, FB Veterinärmedizin, Luisenstraße 56, D- 10117 Berlin, Germany*

^c*Department of Veterinary Public Health, Pharmacology and Toxicology, The University of Nairobi, P. O. Box 29053, Nairobi, Kenya*

^d*Integrated Livestock Development and Indigenous Knowledge, Weizenfeld 4, 51467 Bergisch Gladbach, Germany. Tel. +49-2202-932 921, Fax + 49-2202-932 922, 97332*

^e*Division of Parasitology and Immunology, Zoology Department, The University of Nairobi, P.O. Box 30197-00100 GPO, Nairobi, Kenya.*

wwanzala@icipe.org or osundwal@yahoo.com

Abstract

Livestock industry provides for a major source of livelihood for many people worldwide, particularly the rural poor in developing countries. Ill-health is a major constraint to livestock production and development in rural and peri-urban communities where a half of the world's livestock population is found. Most of these communities live in marginal areas affected with endemic pathogens, vectors and diseases. These areas are not easily accessible to modern veterinary information and services and people are less economically endowed albeit coping with enormous animal health problems. The survival mechanisms and strategies are simply based on people's own local and inherent centuries' old knowledge that has withstood the test of time in all aspects of human evolutionary life. Any attempts to improve the lives of these people through livestock industry, must therefore begin by understanding and recognizing the evolution, application and management of ethnoveterinary medicine in their cultural lifestyle. This approach offers sustainable strategies directed towards developing sound and appropriate animal health care systems suitable and relevant to rural communities in improving livestock performance and production and hence, livelihood. In addition, there would be environmental conservation and management strategies for achieving sustainability, availability, accessibility and affordability of existing ethno remedies and ethnopractitioners. Strategizing community development programmes by building on ethnoknowledge concepts as known and practiced by people, it is by no doubt that feasible and sustainable development programmes will be successfully planned, developed, implemented and managed without external input. To effect and maintain a community-based sustainable livestock production system, it is crucial to learn, evaluate and without being biased and ethnocentric, promote and integrate the beneficial facets of traditional animal health care practices into current primary livestock health care delivery services. This paper reviews and highlights

some historical developments in understanding and recourse to ethnoveterinary medicine and the way forward.

Keywords: Ethnoveterinary medicine; evolution; livestock production; understanding; way forward

Introduction

The era of treating ethnoveterinary medicine and any other ethnoknowledge system with suspicion and labeling it as myth, superstition and witchcraft, is long gone. The role of ethnoveterinary medicine in livestock development is beyond dispute (Martin et al 2001). A great number of professionals from varied fields have over the past 26 years recognised, valued, documented and ethnocentrically studied the potential effectiveness of the traditional animal health care practices embodied in native and local communities. The studies focused on a holistic evaluation of the traditional and non-traditional knowledge, which hold some beneficial aspects relevant to the improvement and development of world poorest rural communities. A glance at the existing literature reveals that the traditional knowledge embodied in ethnomedicine, constitute yet an untapped resource of potentially useful information for possible deployment in sustainable animal health management systems in rural and peri-urban communities all over the world (Morgan 1981; Bolling 1982; Abu-Rabia 1983; Anjaria 1986; McCorkle 1986; McCorkle 1989 a and b; Mathias-Mundy and McCorkle 1989; Zeutzius 1990; Muasya 1993; IIRR 1994 and 1996; Köhler-Rollefson 1994; Bizimana 1994; Mwilawa, et al 1996; Farah et al 1996; ITDG and IIRR 1996; Munyua et al 1998; Mathias 2000; Patricia 2001; Wynn 1999; Mathias 2004). As wide spread as it is, the practice of ethnoveterinary medicine has lagged behind that of its counter part (modern veterinary medicine) many times partly because the practice was secretly done and its information hidden in the gray literature (Mathias 2004). However, it is crucial to note that a sizeable body of published literature now exists, including an annotated bibliography abstracting over 1200 documents (McCorkle et al 1996; Mathias et al 1999; Martin et al 2001). In many native and local stock raising communities if not all, a considerable proportion of useful ethnoknowledge and some of the traditional animal health care practices remain unknown to date, albeit their increased demand to be integrated into primary animal health care delivery systems for wider use by rural and peri-urban communities.

Ethnoveterinary knowledge (EVK) continues to be recognized at a global level as a resource that reflects people's total commitment and experience in life, from origin through evolutionary stages to current situation. These experiences, stem from people's ingenuity, credulity and above all, perhaps, their insatiable curiosity that over many centuries, they accumulated the current rich and resourceful traditional knowledge that has been passed on from generation to generation by word of mouth, traditional songs, poems, drawings, paintings, stories, legends, dreams, visions and initiation ceremonies (Mathias-Mundy and McCorkle 1989; Kokwaro 1993; Backes 1998; Patricia 2001; Mweseli 2004). This knowledge is sketchily recorded in books (Abegaz and Demissew 1998) and is stored in the same fashion as it is transmitted by means of practice or in the form of artifacts handed from father to son or from mother to daughter (Kokwaro 1993;

Patricia 2001). The storage of the knowledge is solely depended on the collective memory of just a few entrusted persons within communities for it is just not common 'knowledge' for every body. The knowledge is believed to be collectively and communally owned by ancestors and kept under the custody of living old men and women, depending on the community, ethnicity, sex, age, caste etc. There is a danger however this method of vesting knowledge in human custodians can be undermined by mortality, thereby losing important information to the future generations.

The identification and acquisition of this knowledge was and is by no means an easy task in the lives of people. It was a gradual process of trial and error mechanisms, which must have caused many a fatality before coming to its current status (Ayensu 1978). People were so adventurous in initial stages of life that through evolution, they laid down what can be considered as a great foundation of modern life! They sorted out plants they could eat and those they could not, and gradually discovered certain qualities beyond mere edibility such as pain-killing, soothing, relief of fevers, clothing, beddings, building materials, source of fire wood, woodcarving, writing materials, worshiping shrines, fences and many other traditional health practices useful to them (Lindley 1938; Huxley 1977). The discovery of all these uses of plants must have occurred in a number of ways, not only by the principle of trial and error mechanism. Some of these ways include: - watching animals treat themselves by eating and rubbing themselves with special plants when ill (zoopharmacognosy) and subsequent adoption of the same remedies, communicating and interacting with the visiting traditional medical specialists from other communities and borrowing their traditional remedial ideas, inheriting the healing powers and magic from parents, buying the healing and magic powers from experienced traditional medical specialists and deliberate experimentation to help select those remedies that work (Mathias-Mundy and McCorkle 1989; Martin 1996; Mathias and Perezgrovas 1997; Wynn 1999; Mathias 2004). A significant amount of knowledge regarding, which plant or traditional remedy works or not, has also been acquired through observation, 'visions' and during ritual communal gatherings (First author's personal experience with ethnopractitioners from Coast, Eastern, Central and Western provinces of Kenya).

Ethnoknowledge focusing on ethnoveterinary animal health care has existed alongside human evolutionary history, taking many different forms. It comprises all ethnopractices approaches and traditional knowledge applied by humans with a view to alleviating health constraints afflicting their livestock and hence, improves their production and performance. This, may take the form of selective breeds and breeding practices, crowning and recognition of renowned ethnopractitioners, animal feeds and feeding behaviour, ritualism, herbalism, spiritualism, ethnoepidemiological knowledge on livestock vectors, pathogens, hosts and diseases and traditional 'institutions' and ecosystems in which this knowledge exist. Like any other knowledge systems, EVK is very dynamic in its evolution, management and practice. Because of this dynamism, many ethnopractitioners find themselves in a situation where they complement EVK with modern veterinary medicine, especially in cases where EVK is limited and or cannot work (Martin et al 2001; Mathias 2004). Enhancement of this approach is most likely to spur research and development of EVK and undoubtedly enable it make immense strides

in the development of livestock industry, more particularly in developing countries where modern veterinary services and resources are really limited in supply and availability. This however, requires good knowledge and understanding of EVK limitations and successes, needs and circumstances of ethnopractitioners, mutual understanding and co-operation between conventional veterinarians and ethnopractitioners and respect to Intellectual property rights (IPR). This review article discusses a variety of issues related to a historical evolution and understanding of EVK in many different ways by different stakeholders as underutilized resource yet to revolutionarize the development of livestock industry in the 21st century. The review further gives a comprehensive critique of definitions of EVK and associated terminologies with a special focus on its threats, resurgence towards the end of 20th century and finally, outlines the way forward for EVK in today's world.

A historical perspective of traditional veterinary medicine

Wynn (2001) describes the today's traditional medicine, as undoubtedly the oldest form of medicine and probably evolved simultaneously with the evolution of human beings. People's association and care for animals' health is a very ancient phenomenon and perhaps, stems from the Biblical times of Adam in the Garden of Eden. This becomes self evident in the Bible when Adam was shown herbal remedies and made the master of all animals (Genesis 1: 26-29). Adam of course was not a professionally trained veterinary doctor who could treat animals when they became sick. However, this mythical presentation *per se*, sends some signals of herbal application in Adam's life time in one way or another but this should however, be considered as an objectivism of the authors.

Historical records reveal people's association with and treatment of animals to be over 14,000 years ago, first with a dog, followed by sheep and goats by 9,000BC in the fertile Nile Valley, and then with cattle in Egypt from 4000BC and in Anatolia around 6000BC (Mellaart 1967). This evolution was followed by pig and horse cultures in view of their importance (Murray 1968). For instance, at around 3000BC horses, elephants, and other animals were highly regarded and were in good association with man in what is present-day, Sri Lanka and could be treated with Ayurvedic medicine (Anjaria 1987). These associations were based on economic, cultural, social and religious beliefs attached to each type of animal and it was during this time that veterinary medicine evolved specifically to take care of the health of animals, which were being domesticated (Thrusfield 1986). For instance, veterinary therapeutic techniques of Egyptian healers (priest-healers) are recorded in the veterinary *Papyrus of Kahun* (c. 1900 BC). They combined both religious and medical roles. Literary records of similar age, describing veterinary medical activities, are extant from other parts of the world, such as Indian Sanskrit texts from the Vedic period (1800-1200BC) (Thrusfield 1986). Succeeding civilizations had varying concepts regarding the causes and remedies of livestock diseases. Table 1 describes these concepts in six categories.

Table 1: Some traditional concepts of causes of livestock diseases and their corresponding ethno remedies

Ancient concept (s) of livestock ill-health	Believed specific cause(s) of ill-health in livestock populations and systems	Ethnoremedy(ies)
Demonic theory	Witches Superhuman entities Spirits of the dead Evil eye Sorcery Religious impurity Predation Rustling Straying	Placation (sacrifices). Prayers. Chants. Exorcism (forcible expulsion). Evasion (scattering millet seeds to avoid vampires). Transference (gadarene swine) (an epidemic of nihilism, the devils). Libations cast to the winds. Forced inebriation of animals. Gaily coloured animals' decoration with yarn, ribbons, flowers, etc. Marriages of live stock couples. Worshipful care of tiny animal idols. Magical-ritual ceremonies. Suspension of amulets, talismans, fetishes and icons, totems etc. in animal quarters or on their bodies. Use of special people such as witch doctors. Incantations. Recitations. Smoke from burning garlic, onion or wood from old rice mortars is used to ward off dangerous <i>hantu</i> spirits. Encouraging cats to live close to animal shelters. Sprinkling of holy water by Catholic farmers in Ireland. Hanging of pictures of veterinary saints in their stables in Europe.
Divine Wrath	Displeased supreme being Disease as a punishment from their gods or God eg, animal plague of Egypt A hex by a vindictive neighbour	Placation (sacrifices) and offering special prayers. Changing lifestyle in the community. Holding a propitiatory rite. Hiring the services of a shaman. Drenching with herbal infusions.

Metaphysical Medicine	Occult forces beyond the physical universe Moon, Stars, Planets Earthquakes, Floods and Comets	Traditional medicines and ethnopractices that persisted for many centuries include the use of toads to treat warts and also the use of sheep livers in Babylon.
The Universe of natural law	Derangement of 4 humours of the body that were associated with 4 properties (heat, moisture, dryness and cold) and with 4 elements (air, earth, water and fire) External forces eg climatic and geological changes Local eruptions of noxious air: the miasma	Alterations in diet and purges. Move away from the site of bad air. Balance the 4 elements: -earth, water, wind and fire Acupuncture.
Contagion	Diseases transmitted by contact or air- borne means by seeds or animalculae being taken in by nose or mouth. Zoonotic diseases were realized when man was suspected to contract infections from dead rats	Separate the sick animals from the health ones and completely avoid mixing the sick and non-sick animals. Kill the sick animals to stop spreading the disease to others. Place some health animals from the sick stock in other persons' herds in order to avoid losing all their stock in case of an epidemic.

Vector Theory	Tse tse flies –Nagana Ticks Lice Mange Other flies and arthropods	<p>Physical removal of ticks from the victim animals-by Fulani and Somalis in Africa.</p> <p>Pierce the ticks with the needle or blade so that they die and fall off-by smallholder livestock farmers in Sierra Leone.</p> <p>Use of <i>Maycha</i> 's leaves (<i>Senecio pseudotites</i> Griseb and <i>S. vulgaris</i>) by Peruvian Andes to drive off the brown ear ticks.</p> <p>Avoiding infested grazing grounds and shade trees infested with flies.</p> <p>Washing of cattle with plant-derived infusion, ointments, dust, eg, from tobacco (<i>Nicotiana tabacum</i> L.) and <i>Sesbania aculeata</i> - by Nigerian pastoralists to control tsetse flies.</p> <p>A wash of squash-leaf juice as a fly repellent-by Venezuelans.</p> <p>Feeding animals on special salty 'plants' so that ticks fall off.</p> <p>Burning of livestock pastures to kill vectors and drive away others by the smoke produced during the burning process.</p> <p>Placing thorn bushes on infested places so that animals like the Camels can not roll there to be infected-by Somalis.</p> <p>Drenching the animals with a mixture of salt and six ground fruits to make the ticks fall off-by Twareg in Niger.</p> <p>Burn cattle manure mixed with water.</p> <p>Mange is treated by the extracts of tarwi plant <i>Lupinus mutabilis</i> – by the Andeans.</p> <p>An application of Wild tobacco leaves and black soap helps control mange – by the Andeans.</p> <p>Banana leaves and garlic extract used by Brazilians to fight swine ectoparasites.</p> <p>Vinegar and Lemon juice used by Andeans to control chicken lice.</p> <p>Andeans use Barbasco or root of <i>Rumez patientia</i> L. control Lice and Mange.</p> <p>Somalis use latex from <i>Euphorbia somaliensis</i>, camel urine or an infusion of <i>Iphiaona rotundifolia</i>.</p> <p>In China, mange is controlled by rubbing rhubarb and caustics into lesions.</p> <p>In Bulgaria, mange is controlled by rubbing tobacco decoction into lesions.</p>
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Sources: Thrusfield 1986; Mathias-Mundy and McCorkle 1989; Martin et al 2001

Based on the authors' experience and published information exemplified by the information in Table 1, it is very difficult to separate religion from traditional medicine but is a unique combination and practical experience and approach to solving health problems in human life history. The subject of offering prayers as a healing power has been extensively referenced in the literature cited, with particular precision and attention to detail by Mathias-Mundy and McCorkle (1989) on the principles of magico-religion beliefs and practices. In summary, the authors quote them:

"Magico-religion practices can not truly be separated from other aspects of ethnoveterinary medicine- even though, for heuristic purposes, this is sometimes necessary."

The separation seems especially artificial in the domain of ethnopharmacology where many remedies used for magical or symbolic reasons have been scientifically proven effective. By both epically and ethically, the line between supernatural and natural is thin (McCorkle 1986). In any event, studying one without the other is scientifically indefensible. Or as Lawrence (1988) aptly observed, merely listing diseases and treatments without placing them in their social and cultural context is as dry as prairie dust- and essentially meaningless. This simply shows a long history of ethnomedicine and how deeply it is rooted in people's cultural set up. It is surprising to note that some of these magico-religion cultural practices parallel the western veterinary medicine in principle and practice. For instance, the Andeans way of keeping livestock herds away from cold, breezy places so as to keep them out of the haunts of the evil winds, is analytically noted to be a useful management strategy to forestall pneumonias or other respiratory ills (McCorkle 1986). In pre-historical, historical or present day societies, the following were and are still some of the reasons for recourse to supernatural approaches to animal health problems:

- African stockowners resort to supernatural approaches so as to cope with livestock health problems they do not understand (Porter et al 1988; Marx 1984; Schwabe 1978; McCorkle 1982).
- It is considered as one of their usual ethnotherapies in societies eg, Nigerian Fulani pastoralists (Ibrahim 1986).
- In case of a new disease emerging eg, Foot-and-Mouth Disease in Peru when it appeared for the first time (Negron 1966).
- It is considered when no effective alternative therapy is available (Ohta 1984; McCorkle 1982).
- It is considered when magic is believed to be the causative mechanism for the ailment eg, the way it is believed that the sheep are magically attracted to a poisonous plant - *Astragalus* (McCorkle 1982).

In principle and practice, the Ayurvedic medicine has been used by man for along period of time and today, it offers great potentials for complementing the contemporary medicine. In Ayurvedic records, the earliest art of ethnomedicine-based practices

advocating for the care of man's health and probably that of his animals, appear to be nearly over 5000 years old in a Chinese pharmacopoeia (Huxley 1977). Sumerians' records, in which about 1000 medicinal plants were documented, over 4000 years ago, later followed this. In addition to these records, Schillborn van Veen (1997) in his introduction, mentions records of veterinarians delivering services as early as 1800 BC, during the reign of King Hammurabi of Babylon, and the creation of animal hospitals during the reign of King Ashoka between 269 and 232 BC in the Rock Edict 11. This kind of veterinary art, we suggest, must have facilitated the development of major veterinary centres, which appear in historical records in China, Egypt and later in Arabia (Schillborn van Veen 1997).

Since these ancient times, the succeeding civilizations all over the world had their herbal experts or doctors, being the local equivalents of university-trained doctors, who could help their fellows in adversities. Nevertheless, these simple traditional cures have continuously and slowly evolved over the centuries from nearly every country all over the world (Le Strange 1977). Some of these countries where, manufacturing of herbal remedies or phytopharmaceuticals have evolved a long with other traditional health practices and even the products are sold either in-country or exported, include:- China, India, Germany, Singapore, Chile, USA, Britain, France, Spain, Japan, Italy, Hong Kong, Republic of Korea, Pakistan, Thailand, Mexico, Madagascar, Egypt, Cameroon, Morocco, Kenya, Zimbabwe, Ghana, Nigeria, Argentina and others (Anonymous 1997). This evolution was more vigorous in advancing in humans than in veterinary pharmaceutical industry (Kofi-Tsekpo and Kioy 1998). However, it is important to note that since pre- historic times, the traditional folklore did not only have medicine for human treatment, but also animal health medicine as shown in the above history (Kofi-Tsekpo and Kioy 1998; Schillborn van Veen (1997). This has been particularly exemplified by the animal health care practices of the pastoralist communities worldwide, such as, the Maasai, the Turkana, the Pokot, the Boran, the Rendille, the Somali, the Sebei, the Karamajong of Uganda, the Fulani in West Africa, Peruvians, the Twareg, the Quechua, the Meau in Thailand, the WoDaaBe, the Andeans, the Baggara Arabs of Sudan, the Nuer, the Datoga of East Africa and the Hausas in the north belt of West Africa (Ayensu 1978; Mathias-Mundy and McCorkle 1989). These livestock raisers, have used medicines locally prepared from plants and other traditional practices in treating and preventing diseases found to hamper livestock production in their respective environments. Therefore, although the veterinary art is such ancient (Bierer 1955), the recognition and subsequent appreciation of people' s traditional healthcare for animals, is a very recent one in both scientific and academic cycles, only its importance being made the focus of attention the beginning of mid-1970s and gaining its momentum from early 1980s (McCorkle 1986). This period of time, should be relatively and appropriately be regarded as a revolutionary period of today's ethnoveterinary medicine and from the foregoing, it is self evident that probably the revolution must have been sparked off by a resolution adopted by the 30th World Health Assembly in 1977, urging interested governments to integrate their traditional systems of medicine into their national health delivery systems (Akerle 1983). In early 1980s advocates of the use of traditional health care systems, must have responded to this resolution and fully came on the scene advocating for the same (Sollod and Night 1983; FAO 1980; 1984a; 1984b; 1984c and

1986; McCorkle 1982 and 1986). And after the mid-1980s, the term 'ethnoveterinary' was born and introduced into academic and scientific cycles through the efforts of Dr. Constance M. McCorkle (McCorkle 1986). Probably, the first significant step in response to these revolutionary reactions and realization of the importance of this subject, was the birth and appreciation of this terminology, followed by the work of Mathias-Mundy and McCorkle (1989), in compiling an annotated bibliography comprising 261 references, in which 237 are annotated, with greater emphasis being put on the ethnoveterinary medicine of African continent and Latin America and slightly Asia. In their bibliography, the authors endeavours to close the gap between the traditional practitioners and the advocates of the orthodox/contemporary medicine (allopathic medicine) by strategically evaluating a point where the two can strike a balance of understanding, working together and complementing their efforts for the betterment of the less disadvantaged livestock raiser rural and peri-urban communities of the world in both the developing and developed countries. The second move in this direction, centres on Zeutzius (1990), who published a similar amount of work comprising 300 references, mainly from the data banks, although most of the references also appeared in the first bibliography of Mathias-Mundy and McCorkle (1989). However, the two complemented one another and from the analytical point of view, their agenda appears to be the same in highlighting the need to focus research on ethnoveterinary medicine and ultimately blending with conventional veterinary practices in order to achieve sustainable animal health care in rural and peri-urban communities of the world. Together with other new advocates of ethnoveterinary medicine who later came on the scene, such as Bizimana (1994), IIRR (1994), Köhler-Rollefson (1994), Mayor (1994), Mwilawa et al (1996), Wynn (1999), Farah et al (1996), ITDG and IIRR (1996), Munyua et al (1998), Mathias (2000), Patricia (2001) etc., strongly agitated for the complete integration of indigenous technical knowledge with conventional scientific knowledge so as to be in a position of solving common problems facing rural and peri-urban communities of the world involved in livestock raising. The ultimate in this development has been the publication of a voluminous annotated bibliography of community animal health care consisting of 1240 publications that deal with socio-cultural, politico-economic, environmental and biomedical aspects of ethnoveterinary medicine all over the world (Martin et al 2001).

Nevertheless, before 1977, there were more descriptive reports, which had appeared in record about ethnoveterinary medicine, some dating back to 1910 by anthropologists, sociologists and others by veterinarians (Mares 1951; 1954a,b; Mathias-Mundy and McCorkle 1989). But one major shortcoming aspect of these reports was that they never defined clearly the terminology 'ethnoveterinary' or whatever they were describing in the field as their observations and experiences of traditional animal health knowledge. Otherwise, before this great revolution period- 1977-2001, ethnoveterinary medicine was purely the art subject of anthropology, history and sociology and hardly recognized and appreciated by western-world researchers, scholars, planners, developers and particularly veterinarians, as a socio-cultural medical discipline of veterinary importance (Nigeria 1929; Larrat 1939; Lodrick 1981; McCorkle 1986; Mathias-Mundy and McCorkle 1989; McCorkle et al 1997). And yet, veterinary medicine as practiced today by western-world veterinarians, has its origin and deep roots in tradition medicine as practiced in pre-history in China, India, some parts of Asia and Africa (Nile valley in particular) and the

Middle East (Schwabe 1978; Schillhorn van Veen 1997). This therefore poses a great challenge to the advocates of ethnoveterinary medicine to try and trace the lost route of the traditional animal health care practices in the new millennium of 21st Century.

Why was ethnoveterinary medicine not carried forward upon the arrival of **orthodox* medicine?**

Since time immemorial, ethnomedicine has existed with human beings as a kind of cultural art of health and practice that helps people solve all health-related problems. Interactions amongst people with diverse cultural evolution lines, have resulted in adoption and abandonment of certain traditional health practices that are crucial to the survival of man. With the arrival of modern medicine and continued ethnocentric interactions, some of these vital traditional health practices were completely abandoned without considerations until the turn of 20th century is when it was realized that some vital traditional health information was left behind and need to be retrieved. This is clearly illustrated by some reports from India (Hirachandra 1924; Mushtaq or Mushtaq???1926; Naidu 1933; Sharma 1933; Parera 1941; Krishnaswamy 1945; Krishnamurthi 1946), and as reported by McCorkle et al (1997). However, the realization was not given the seriousness it deserved until towards the end of 20th century and the beginning of 21st century is when the western-world researchers, scholars, planners and developers accepted in confidence of the fact that ethnoveterinary medicine is equally important as orthodox medicine and the two can complement one another to achieve a sustainable livestock health care delivery system. Indeed, it is true as Martin et al (2001) concluded in their article that ignoring ethnoveterinary medicine in today's development would mean losing a very important and special component in life history of mankind that definitely would have made a difference for better! Why then was this 'special and important component' left behind, only to be remembered later? The following are some of the possible reasons for not carrying forward ethnoveterinary medicine upon the arrival of orthodox medicine [Orthodox: Morally and ethically accepted, approved and true opinion or way of thinking and or doing things in life) (Webster's Revised Unabridged Dictionary 1913). As compared to traditional animal health care developed and practised through trial and error methods and deliberate experimentation and is therefore less documented, systematic, formalized and not universally recognized and for these reasons, it has had no place in mainstream veterinary medicine (Mathias 2004)] although as Mathias and Perezgrovas (1997) explain in their paper, the full utilisation of this knowledge depends on:

- remoteness of the project promoting its use,
- a community's way of life (are they arable farmers, pastoralists, commercial farmers or semi-pastoralists),
- environmental conditions,
- availability of alternatives,
- recognition of the value of the ethnoveterinary medicine,
- characteristics of the local versus introduced systems in terms of efficacy, costs, availability and cultural feasibility,

- economic value and purpose of the animals kept and the relationship between humans and animals,
- available information on proven effective indigenous, drugs and practices,
- status of thinking, and
- type of livestock diseases and problems.
- When orthodox veterinary medicine was introduced, many orthodox veterinarians did not promote indigenous practices in any ways because they did not understand it and therefore, they did not appreciate the role, which ethnoveterinary medicine played in the life history of mankind (Toyang et al 1995),
- In most countries all over the world, the state laws were and have not been enacted to govern, advocate and promote the utilization of the traditional knowledge in either independent, a long side the modern ones or in complementary with the orthodox medicine. So, in many countries like Cameroon, most of people's medical traditional methods and practices were considered illegal and hence, secretly practiced (Toyang et al 1995),
- Some people believed that ethnoveterinary medicine never used to cure diseases completely (The ANTHARA Team 1997),
- Thought to be very primitive and witchery (Fielding 1997),
- The belief that orthodox medicine is superior to indigenous and is capable of solving all the livestock health problems when in actual sense, it doesn't (Toyang et al 1995; Nuwanyakpa et al 1995),
- There was very little research done to support the arguments for the practice of ethnoveterinary medicine and therefore, there being no enough scientific evidence, there was increased lack of confidence in the effectiveness of ethnoveterinary medicine (Fielding 1997),
- Ethnoveterinary medicine was considered out fashioned and accompanied with lack of information regarding its use (Fielding 1997),
- Modern drugs were found to be easier to use and even apply (Fielding 1997),
- Some new emerging diseases such as enterotoxaemia in cattle and blue tongue in sheep, were found not to have the expected traditional cures and so to many other contagious diseases (The ANTHARA Team 1997; Rathore et al 1997),
- Quite a number of succeeding generations of the world came to realize that the traditional plant medicines are hard to standardize and can be a bother to prepare (The ANTHARA Team 1997; Martin et al 2001),
- Toxic problems and poisoning associated with particular ethnomedicinal plants or herbal product types were well documented and understood (Mugera 1970a,b; Kokwaro 1993; Wichtl 1994; Röder 1995; Leung and Foster 1996) and this scared the potential users who then opted to use conventional therapies,
- A whole plant, or the required part(s) such as leaves, flowers, fruits, buds, barks etc., may not be available throughout the year or at the time of the year when it is really required, particularly in summer (The ANTHARA Team 1997). So in some cases, it was self evident that people were forced by circumstances to start using industrial pharmaceuticals,
- Not enough experienced people or healers are available,

- To some, it was out of curiosity to evaluate the effectiveness of the new conventional drugs following their advertisement in the media and to others, it was a time to change from their old traditional methods to modern ones,
- The confusion that exists between superstitious beliefs and ethnoveterinary treatment (The ANTHARA Team 1997),
- The western practitioners wanted to market and test the performance of their conventional/contemporary medicines under different environmental conditions by convincing the natives/locals, particularly those from the developing countries to abandon their traditional medicine and immediately adopt the orthodox medical system,
- Many people from the western world who introduced the orthodox medicine to the natives/locals in many developing countries were missionaries who advocated for healing powers from God through the administration of only synthetic drugs from their respective countries, hence a marketing strategy of synthetic medicines from the developed world. The natives/locals were completely discouraged from using and practicing their traditional medicine in any ways as it was considered to be witchcraft and sinful and therefore, ungodly,
- Unfortunately, veterinary traditional herbal medicine has a long way to go before the doses and protocols are formalized like it is the case for human beings (Wynn 2001). For instance, Wynn (2001) reported in her article that, herbalists do commonly relieve arthritic pain using white willow. She further explained that white willow contains salicin, which is similar to the salicylic acid found in aspirin. Now, if one attempted to treat an arthritic cat with a smaller dose of white willow, the cat might experience a fatal reaction, since cats cannot metabolize salicylic acid. She gave a second example of garlic, which causes chronic toxicities in animals by producing anemic condition in the victim animal, when it has been described as a powerful antimicrobial agent, for cardiac treatment and for cholesterol lowering agent in humans,
- The traditional animal health care developed and practised through trial and error methods and deliberate experimentation and is therefore less documented, systematic, formalized and not universally recognized and for these reasons, it has had no place in mainstream veterinary medicine (Mathias 2004),
- Little or no research is focused on traditional veterinary medicine to understand the underlying science and promote validation procedures and processes (Lans 2001).
- The failure of key stakeholders in traditional animal health care systems to differentiate between herbal medicines, ritual medicines and witchcraft.

Definition variability: towards understanding or misunderstanding ethnoveterinary medicine!

Since pre-historic times, man was aware of traditional veterinary medicine, though haphazardly studied and recorded, until recently. A milestone in understanding the traditional veterinary medicine as applied and used by local people, was the determination and definition of the term 'ethnoveterinary.' This term was for the first time

in research forum, applied and used by Dr Constance McCorkle in 1986 (McCorkle 1986). She used it to refer to the 'systematic investigations of folk beliefs and practices in veterinary medicine,' by then. And later, defined it as local or indigenous knowledge and methods for caring for, healing, and managing livestock. This included social practices and ways in which livestock are incorporated into farming systems. Ever since, many researchers have come up and defined it in ways that suit and meet their interests, needs and situations. For instance, three years later, Mathias-Mundy and McCorkle (1989) equated traditional veterinary medicine to 'veterinary anthropology' and defined it better than before as 'folk beliefs, knowledge, skills and methods and practices pertaining to the health care of animals.' Many researchers worldwide, still up to date refer to this last definition irrespective of it having undergone many changes in definition and understanding. Many other researchers have used a language within the domain of their own profession to describe ethnoveterinary terminology. For instance, basing on the understanding of Martin (1996), a world-renowned ethnobotanist, referred to the prefix, *Ethno-per se*, as, that is the way other people look at the world around them. This statement, in its originality, precisely favours scientific, cultural and philosophical approach to a holistic consideration of how life is managed in different communities all over the world. To be more specific probably, this prefix, when used before a name of an academic discipline such as Veterinary, Biology, Botany etc., it refers to a holistic exploration of the local people's perception of socio-cultural, anthropological and scientific knowledge in their respective native/local environments. In the same vein, the term 'ethnoveterinary' therefore is currently and increasingly being used in the context that relatively describes all studies, which concern local people's perception and subsequent interaction with the native/local natural environment with a view to evaluating that, which can be used to take care and manage animals' health. This step-by-step definition sounds to be more liberal and natural than the former definitions. However, it should be carefully noted that this definition is a combination of concepts, not originating from one source, but most likely an outgrowth of Martin's experience and related interactions with specialist medicinal remedy users such as herbalists, hunters, pastoralists, gatherers, fishermen, gardeners etc., from varied communities in the field, all over the world. It is crucial also to realize that this definition in itself is relative and not absolute as many readers are most likely to misunderstand. Indeed, it is self evident and follows with logical necessity that this subject forms a very interesting interdisciplinary area of study, criss-crossing and encompassing a diverse range of academic fields such as: - Botany, Chemistry, Veterinary, Biology, Anthropology, Ecology, Economics, Linguistics, Sociology, Zoology, Pharmacology, Geography, Pharmacognosy, Nutrition and Phytochemistry, in its quest to attain a holistic vision of local and native ecological knowledge. Because of its interdisciplinary nature, the term has been accorded with many other related definitions emanating from the scope and the depth of its understanding by different researchers thus expressing their ethnocentricity. According to Martin (1996), and relating to the above argument, ethnoveterinary in simple terms, is supposed to be a sub-discipline of ethnoecology, that simply means, the 'ecological wisdom of local people regarding animal health.' ITDG and IIRR (1996) definition closely follows that of Mathias-Mundy and McCorkle (1989). While Mathias and Perezgrovas (1997) definition integrates the tradition context of understanding science in animal health management: 'a whole system that the local people, through trial and error and also deliberate

'experimentation', developed to keep their animals healthy and productive (and simply say, that is indigenous animal management and health care comprising medicines and practices).' Others view ethnoveterinary knowledge (EVK) as a dynamic subject that is ever changing and evolving as more and more information is revealed and gained locally and or imported and adapted locally (Akabwai et al 1997). According to Akabwai et al (1997), understanding of EVK, the following four definitions was retrieved from their descriptions, from which they adopted the first one. EVK:

- is the knowledge that relates to farm-based strategies of animal production and health in non-industrialised agricultural and livestock systems,
- also known as: 'existing veterinary knowledge', is the fusion of traditional and western information on the environment, marketing, animal health, nutrition, and drought coping strategies, disease patterns, and management strategies,
- is that knowledge that is 'experimental', magical or mystical, traditional and experimental in nature, and
- is the sum of the local knowledge base - both past and present.

In their first definition, they seem to be biased and denying the fact that in industrialized world, there is no EVK, when in reality, it is not actually the case. However, the definition in itself is limiting though denied and exemplifies the characteristics of ethnocentricity. In their second definition, the word 'western' when considered as it is used in this paper and by many advocates of EVK and Ethnoveterinary Research, Development and Extension (ERD and E), then, it is wrongly placed in this definition. Its presence alone changes the original perception of EVK and does not now bring out the difference between the EVK and 'western' knowledge, so called conventional or modern science. The authors probably were of pro-western ideology and, with the word 'fusion' also used in the same definition; it is unequivocally considered that they probably wanted to refer to EVK as native/local knowledge. This is because, native/local knowledge as explained in this paper, refers to the knowledge held by natives or locals and does have its origin in traditional lifestyles, spiritual philosophy, taboos, social relations and contest, customs, cultural values, etc. in their traditions and cultural practices. However, it is important to note that local knowledge is not native/indigenous knowledge; the two differ in their origin, adaptation and application. Native/indigenous knowledge refers to purely original knowledge of a particular community without any knowledge coming from outside the community's traditions and culture. It is the knowledge held by the natives/indigenous people and handed down to them from the previous generations by oral tradition. Whereas local knowledge could be either of natives/indigenous people or immigrants or both and it may consist of mainly knowledge coming from outside the community's traditions and culture (that is, indigenous knowledge of another community). However, 'western' knowledge has its own EVK that can be blended with other EVKs from a cross many cultures and traditions but this is not the intention of this word 'western' in this particular definition. The third and fourth definitions of Akabwai et al (1997), have their own limitations also but they however march with other definitions already mentioned or yet to be mentioned in this paper.

As the new millennium of 21st Century approached, either new advocates of EVK described many other definitions or the old ones modified their old definitions to cope with the changing and dynamism times of understanding ethnoveterinary terminologies. For example, Mathias (2000) is an old advocate of the revival and use of traditional knowledge, who defined the terminology as: 'traditional practices used by livestock raisers all over the world to keep their animals healthy and productive, and to treat and control diseases.' This is more or less the same but, nevertheless better in scope and depth of coverage than what she defined some 11 years ago (Mathias-Mundy 1989a,b and c), thus showing a steady growth of interest and development of research in this subject. Martin et al (2001), simply said, 'it is that which relates to people's animal health.' This definition is so brief and lacks the required specificity and leaves one wondering whether it is referring to traditional or western-style veterinary medicines. At Cornell University College of Veterinary Medicine, advocates of veterinary folk medicine from the Department of Animal Science, gave it yet another simplistic definition as 'local or indigenous knowledge and methods for caring for, healing, and managing livestock' while on the other hand, they also defined it as 'the use of plants and traditional methods for treating animals.' Further, they said, the first definition includes social practices and ways in which livestock are incorporated into farming systems and so preferred that to the second one in their own opinion.

In reviewing Dr. Constance M. McCorkle's work, Dr. Robert Imrie (Imrie 2005), who in his arguments appeared to be a cultural anthropologist, described ethnoveterinary medicine as 'the study of veterinary folk medicine.' According to him, traditional veterinary medicine and veterinary folk medicine are entitative. While this is far from distinction or merging probably for the purpose of understanding, he further argued that 'veterinary folk medicine' has been, today, transmogrified into the much more impressive-sounding 'Ethnoveterinary Research, Development and Extension (ERD and E)'(McCorkle 1998). The advocates for ERD and E, define it as 'the holistic, interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners, and the 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.' This last definition is more elaborate and appreciates the holism and interdisciplinary nature of ethnoveterinary subject and people's quest to attain a certain status of development in society. This ambition is manifested in people's development of an empirical knowledge of remedies from plants and non-plant materials and other socio-cultural animal husbandry practices and technologies for solving animal health-related problems. The acquisition of this empirical knowledge was by no means a simple issue putting into consideration the previously explained many possible ways by which people must have used to bring this rich folk medicine knowledge to its current status (Refer to the last part of the introduction section of this paper). McCorkle's (1998) definition is exhaustive in itself and as Imrie (2005) puts it, it deals with 'brass-tacks factual' considerations and hence bravo. From our own understanding of the application of traditional health remedies and to that of many others advocating for its use, the intended functioning and purpose of the remedy, all are taken care of by the term 'holistic' in the

above definition by McCorkle (1998) and because of that, we will without any reservation, therefore, consider it a standard definition that should be recommended for use for the time being. According to the American Holistic Veterinary Medical Association (AHVMA), holistic thinking is centered on 'love,' 'empathy' and 'respect' and the term means 'taking in whole picture of the victim animal, that is, the environment, the disease pattern, the relation of the animal and the owner and developing a treatment protocol using a wide range of therapies for healing the animal.' In addition, holistic is the most suitable term to apply to ER and D because, according to AHVMA, its meaning relates too to the provision for a conducive environment relevant for the victim animal to recover. This is because, by its very nature, holistic medicine is humane to the core and that the techniques involved are gentle, minimally invasive, and incorporate the victim animal's well being and stress reduction (Anonymous 1998-2001). Moreover, the original use of the term holistic in ethnoveterinary medicine highlighted the fact that local people's 'science' does not follow the western specialization for example, local people do not necessarily differentiate veterinary medicine *per se* and animal husbandry as western science does but they rather take an integrated approach to animal health care. If they have divisions, they may be different from the western ones (for instance, they may divide things up by species and practices may differ accordingly). In view of the broad definition of the term, holism in ethnoveterinary medicine by the AHVMA, we really do not know the intended meaning of this word, holistic, as it is used by McCorkle (1998) in her definition. But in summary, we will consider what AHVMA has abstractly considered the term, holism to be, 'the most efficacious, least invasive, least expensive, and least harmful path to cure and prevent health-related problems in livestock industry.' It can really be considered that by this approach, a guided and an effective new level of livestock health management system will be reached soon. Nevertheless, this should be taken as the way forward for the development of delivery of animal health services to rural and peri-urban communities in both the developing and the developed countries, in order that a well-integrated and most sustainable system is achieved and maintained for livestock production. However, it is indeed crucial to note that the sense in which the word holistic is applied and considered in contemporary medicine, is slightly different from the way it is considered in a traditional medicine system. In contemporary medicine, the term holistic is considered on a herd basis, that is, the entire livestock farming system, while in ethnoveterinary medicine, it is more strongly considered on an individual basis than on the herd basis.

While the first definitions were mostly done by anthropologists and were rather academic in their wording, covering only veterinary medicine *per se*, more recent definitions stem from articles that address field level workers and general audiences rather than academicians, veterinarians and anthropologists, covering a wide range of traditional veterinary health management aspects. Naturally the wording is different in such sources compared to papers that are published in academic journals. This implies that while the wording of the definitions differs, the definitions might still be the same. However, in view of all these definitions, the authors wish to adopt their meaning of ethnoveterinary medicine as: a holistic tradition or local/native system of livestock health management rooted in the people's cultures, customs, taboos and traditions and adopted by livestock raisers all over the world in their respective environmental conditions to keep their

animals healthy and productive and to treat and control diseases and livestock-related problems by use of medicines, management practices, information about diseases, animal production and breeding methods, tools and technologies and magico-religious beliefs embodied in people's traditional and local practices for their own developments and survival. Although not absolutely exhaustive, the author's definition reflects the originality, applicability and utility of ethnoveterinary medicine as perceived and understood in the past and in today's world.

This collection of 'species' of definitions of the terminology 'ethnoveterinary' *per se* is one of its own kind in literature and truly reflects people's struggle to interpret the terminology in relation to their culture, customs, profession and unquestionably, in donors' favour to suit their needs and research priorities. It clearly shows ethnocentricity in researchers' profession, which is a weakness in itself. With that focus therefore, fear is growing in this kind of behaviour because, sooner or later, this is most likely to change and probably 'dilute' the originality of native/indigenous knowledge and eventually lose its original philosophical meaning, focus, trend and approach. By this conduct amongst the researchers, it is greatly feared that the native people who are the owners of the knowledge, may soon or later, not recognized, appreciated and in the long run, not rewarded accordingly as it is expected. The manifestation of this can be justified in this paper! From the above 'species' of definitions of the terminology 'ethnoveterinary', none of the researchers/western evaluators attempted to define the terminology with respect to local/native people's wishes or even just quoted the definition of the local/native/indigenous people or veterinary ethnopractitioners or para vets. This is not only surprising but threatening too! Unless therefore officially recognized safeguards are installed, the western researchers/western evaluators and the cream research team of respective societies are in the process of forcefully taking away and owning what does not belong to them in any ways!

The traditional knowledge *per se*

It is worthwhile mentioning and reviewing critically the use of this phrases:- Traditional knowledge, Indigenous knowledge, folklore knowledge, Local/native Knowledge and non-Traditional knowledge, for which ethnoveterinary knowledge is part and parcel. Which one is which in the Kingdom of ethnoveterinary medicine! Indeed, it is a fact that there are difficulties in defining indigenous knowledge. One reason for this difficulty is the fact that one of the characteristics of indigenous knowledge is that it is (and has always been) dynamic and changing. It is very difficult to capture something that is in flux. For instance one would ask, is the indigenous knowledge only what has been always there? Is it still indigenous knowledge if it has been mixed with outside knowledge eg farmers in the famous Banaue rice terraces started using old tires to enforce the corners of the walls of their traditionally built rice fields, - is this still indigenous knowledge? Where should the boundary be, between modern and indigenous knowledge? From a development point of view, everything developed by the native/indigenous population prior to a proposed intervention makes up the community's cultural identity and should be regarded as a starting point and potential resource for the community's further

development. In practical development, the goal is nearly more important than a water-tight social science definition. The ultimate goal is to build development on what's in the community rather than replacing native/indigenous practices with introduced ones without evaluating whether the native/indigenous practices are useful or not.

Many scholars and researchers, particularly those with the western ideology, have caused confusion in the philosophical meaning, use and application of these phrases in today's world of building on what we know and practice. The Alaska Native Science Commission (ANSC) which endorses and sustains scientific research that enhances and perpetuates Alaska Native cultures and ensures the protection of indigenous cultures and intellectual property, gives a very sound background of what all these phrases are all about in a dynamic manner. The Executive Director of ANSC, Dr. Patricia A. L. Cochran was quoted saying, 'When an elder dies, is just like a library burning down.' This statement has a far-reaching implication on societies' cultures and cultivates a better understanding of the elders' ethnoknowledge and in it self, represents important steps in closing the gap between the elders and the western-trained researchers and professionals. It is a statement that strongly advises people all over the world to come together for a common goal and rescue an important information that is just about to disappear for ever. The same statement was an expression of Plotkin (1990) to refer to the many hundreds of books and publications that can be written out of just one elder's experience with the natural environment. These elderly people are indeed repositories of valuable knowledge that is a significant source of leads for developing new therapeutic and anti-pest agents in today's pharmaceutical industry (Hamburger et al 1991; Torto and Hassanali 1997). The ANSC and Martin (1996) clarify the differences between the above mentioned phrases:

- 'Folklore knowledge' is the traditional beliefs and stories about people of a particular evolutionary line.
- 'Local/native people' are residents of a region who have gained their ecological knowledge from empirical (deriving knowledge from experience alone) observation of nature and from communication with other people in their culture and out side their culture.
- 'Traditional knowledge' is the inherent knowledge held by the local/native people, handed down to them from the previous generations by oral tradition. Is this knowledge that identifies a given group as belonging to one type of culture. It is the cornerstone of Native cultural identity and survival as a people. Some aspects of this knowledge are common and shared while others are more localized and specific to certain communities, families and even individuals.
- 'Non-traditional knowledge' is that body of knowledge that is extensively obtained from outside people's culture and does not have its origin in traditional lifestyles, spirituality, philosophy, social relations, customs, cultural values, etc of the people.
- 'Local/native knowledge' is the composition of borrowed/foreign knowledge and inherent people's knowledge that has its origin in traditional lifestyles, spirituality, philosophy, social relations, customs, cultural values, etc of the people.

In fact, it can be argued that all 'native knowledge', 'traditional' and otherwise, is contemporary. ANSC has given meaning from a frame of reference that is continually being updated and revised. Viewing native knowledge as traditional and static invites denial of the relevance and efficacy of the application of native knowledge to contemporary issues and problems. In other words, natives sometimes feel that the use of traditional knowledge to denote all that they know imposes a way of life on them that is shackled to the past and does not allow them to change. According to the authors' understanding, the phrase, 'indigenous knowledge'- should be equivalent to folklore knowledge and traditional knowledge. While the phrase, 'native ecological knowledge', should refer to the composition of both traditional knowledge and experiential knowledge(that is knowledge gained through personal experience).

It is therefore crucial to realize that from the above evaluation, native knowledge is not just traditional knowledge. However, together, these two sources of knowledge, traditional and non-traditional, articulate to produce a frame of understanding and validation that give meaning to the world around them. Below is the direct expression of ANSC views regarding ecological and non-ecological knowledge. Many natives possess ecological knowledge that is traditional in nature. They depend extensively on this knowledge for maintaining their relationship with animals and providing food for their families. But they have also gained extensive ecological knowledge from their own experiences with the land and other sources (such as formal schooling and contact with biologists). In fact, their experiences often validate, inform and give new meaning and value to traditional knowledge.

However, the understanding of traditional knowledge still continues with different school of thoughts. The Director General of United Nations Educational, Scientific and Cultural Organization (UNESCO) quoted by Mayor (1994), defined traditional knowledge as 'an immense knowledge about natural environments, based on centuries of living close to nature, possessed by indigenous people of the world.' Living in and from the richness and variety of complex ecosystems, people have an understanding of the properties of plants and animals, the functioning of ecosystems and the techniques for using and managing them that is particular and often detailed. In rural communities of developing countries, locally occurring species are relied on for many uses - sometimes all - foods, medicines, fuel, building materials and other products. Equally, people's knowledge and perceptions of the environment, and their relationships with it are often important elements of cultural identity. On her own and/or probably on behalf of ANSC, Patricia (2001), defines traditional knowledge as '*that knowledge held by natives and handed down to them from previous generations through oral tradition and in the form of traditional songs, stories, legends, dreams, ceremonial methods and practices and preserved in artifacts which are handed from father to son or mother to daughter.*' And probably for the first time in record and in history of traditional knowledge, she appreciates and recognizes the role of natives by describing in the following six ways the native people's definition of the phrase: traditional knowledge.

- It is practical common sense based on teachings and experiences passed on from generation to generation.

- Traditional knowledge is knowing the country in which you live. It covers knowledge of the environment - snow, ice, weather, resources - and the relationships and interactions between things.
- It is holistic. It cannot be compartmentalized and cannot be separated from the people who hold it. It is rooted in the spiritual health, culture and language of the people. It is a way of life.
- Traditional knowledge is an authority system. It sets out the rules governing the use of traditional resources - respect, an obligation to share. It is dynamic, cumulative and stable. It is truth.
- Traditional knowledge is a way of life - wisdom is using traditional knowledge in good ways. It is using the heart and the head together. It comes from the spirit in order to survive.
- It is that knowledge, which gives credibility to native/indigenous people.

In summary, local knowledge is a sum of inseparable parts (articulate or merge), unique, dynamic and evolving systems, based on the shared experiences, customs, life values, traditions, lifestyles, social interactions, ideological orientations and spiritual beliefs specific to native communities. These are forever evolving as new ethnoknowledge is obtained, generated or re-generated to suit the needs and circumstances of people.

Threats to ethnoveterinary knowledge

Modernisation coupled with poor storage format of ethnoveterinary knowledge based on individuals' remembrance abilities and its transmission from generation to generation by word of mouth, has greatly endangered its survival and sustainability into the future. The resultant effect of which has been the realization of a great loss of very vital information. The rapid socio-economic, ecological and technological changes in peoples' lifestyles, has greatly led to the disuse or total loss of traditional knowledge (Principe 1989; Mathias and McCorckle 1989; McCorckle 1989; Kokwaro 1993; Martin 1996; Longuefosse and Nossin 1996). It is further anticipated that the rate of this knowledge's decay and disappearance is alarming worldwide and, if precautions are not taken, it may continue becoming worse with time. This loss is due particularly to the kind of life style the generations expected to inherit the knowledge, lead. Many young people have lost interest in learning from their parents and great-grand-parents. To them, the whole knowledge is dismissed out-of-hand as witchcraft and ineffective. Today, this situation is exacerbated by (i)- the western faith of denominations and their views that traditional practices are evil, satanic, sinful and therefore unGodly; (ii)- poor reminiscence amongst these generations; (iii)- the kind of lifestyle that does not embrace on traditional values of the society; (iv)- cultural interaction, formal schooling and direct exposure to non-native values, attitudes, ways of thinking, philosophies, institutions, etc., through television, radio and other media; (v)- there is no official recognition of the role played by ethnopractitioners in the prevention, control and treatment of livestock diseases/conditions in some countries; (vi)- traditional taboos, customs and other laws governing the practice of folk veterinary medicine in relationship to age, aptitude,

economic, marital and social class of the individual. Together, these six factors make the young generation not emulous enough to perpetuate the traditional morals of the society.

In addition to the above factors, environmental degradation due to artificial and natural factors result into plant and animal species extinction and together with the death of true forest people without their knowledge being documented or passed over to another person in the community represents two major threat to the survival of this knowledge.

Many natives view the extraction of their traditional knowledge from its broader cultural context as a form of theft and, understandably, have been reluctant to practice and share the depth and breadth of what they know with outside interests. In other words, there is no knowledge dissemination processes or procedures. They also fear that, because many development professionals and planners including government managers and decision-makers do not understand their culture, customs or values, their traditional knowledge will somehow be used against them (for example setting quotas and other hunting regulations and the general harvesting of herbal medicines from the forests). At best, piecemeal extraction of traditional knowledge from its larger cultural context invites misrepresentation and misinterpretation. At worst, it represents a form of misappropriation and cultural exploitation, which provides for a great threat to the survival of the knowledge.

Why a resurgence of interest in the folk veterinary medicine?

Once considered a poor man's affairs, sinful, out-dated and witchcraft, the folk veterinary medicine and traditional medicine in general have currently emerged, as McCorkle (1998) describes, 'very fertile fields' that are really promising to benefit the entire population in the world. This realization comes in the wake of hard economic times when people's purchasing power is too poor to afford cope with ever rocketing medical expenses. In this situation therefore, tradition medicine offers the best alternative, particularly to world poorest rural areas of developing countries. Although cosmopolitan medicine is widely used all over the world, the majority of lay people in many rural and peri-urban communities which comprises 80% of the world's population (WHO, IUCN and WWF 1993), still hold applicable concepts of health and illness which are largely indigenous in their own sense. They strongly believe and successfully use their traditional medicine and today, their eagerness to remain firm like this significantly contributes to the resurgence of interest in the folk medicine. The days are gone or are going when folk medicine of local/native communities was considered with suspicion as based on myths and labeled primitive. Anyone using this approach now would be failing to keep pace with what is happening elsewhere, for instance, in China, Japan or India. Although the human traditional medicine advanced faster than that of veterinary (Kofi-Tsekpo and Kioy 1998), the reverse is currently taking place, and the advocates of ethnoveterinary medicine are seriously campaigning for its intervention (Morgan 1981; Bolling 1982; McCorkle 1986; McCorkle 1989c,d; Mathias-Mundy and McCorkle 1989; Zeutzius 1990; Muasya 1993; IIRR 1994; Köhler-Rollefson 1994; Bizimana 1994; Mwilawa et al 1996; Farah et al 1996; ITDG and IIRR 1996; Munyua et al 1998; McCorkle 1998;

Mathias 2000; Patricia 2001; Wynn 2001). The evaluated veterinary traditional health techniques and practices such as pharmacology, Toxicology, vaccination, surgery, acupuncture, manipulative and osteopathic medicine, and many other traditional management practices as well as herbal and holistic medicines are increasingly being accepted in western societies (Mugera 1970a and b; Mathias-Mundy and McCorkle 1989; Bizimana 1994; Farah et al 1996; ITDG and IIRR 1996; Schillhorn van Veen 1997; Munyua et al 1998). From statistical analysis of 1988, it was noted that in the USA, more people seek medical attention from ethnopractitioners (425 million visits) than from the primary care physicians (388 million visits) (Eisenberg et al 1993). Schillhorn van Veen (1997) further reported that similar development was seen in animal health where the ethnoveterinary medicine is increasingly becoming the mainstream. The acceptance and appreciation by the western practitioners, of the fact that some traditional practices and traditional knowledge regarding natural substances of plant origin have been, and still are, used by different societies throughout the world to kill or repel parasitic arthropods on livestock, has further, made it possible for the renewed interests in this subject and exploit the possible deployment of these practices into the currently used Integrated Pest Management (IPM) (Matzigkeit 1990; Schillhorn van Veen 1997). It is now realized that this kind of complementary medical approach is crucial and necessary to boost livestock production at community level (Toyang et al 1995). Nevertheless, there are a number of reasons, which must have been considered before the advocates came on the scene to champion ethnoveterinary medicine to its current state. Some of these reasons are evaluated below.

- Herbs represent one of the first pharmacological interventions attempted by healers, and even today, 25% of our conventional drugs are plant derived in a traditional format (Spore 1992). The World Health Organization (WHO) states that 74% of these plants derived medicines have modern indications that correlates with their traditional, cultural (and sometimes ancient) uses (Wynn 2001). In addition, more than 80% of the world's people, mostly in poor and less-developed countries, depend on traditional medicine for their primary health care requirements (Bajaj and Williams 1995; WHO, IUCN and WWF 1993),
- Because traditional herbal therapeutics have proven efficacious by the standards of both history and modern medicine, many plants used in folk medicine have many applications in western scientific medicine for example, quinine, picrotoxine, strophanthine, aspirin, opium, hashish, ephedrine, curare and *Rauwolfia serpentina* etc. (Foster and Anderson 1978) and herbs such as *Combretum mucronatum* and *Mitragyna stipulosa*, are considered drug of choice for the treatment of Guinea worm disease (Ibrahim 1986),
- The fear that valuable traditional health methods, practices and many other vital ethnotherapeutic agents of healing are decaying and vanishing at a very high rate and yet their potential contribution to health in rural and peri-urban communities worldwide, are beyond dispute. This is manifested in high rates of plant species extinction as a result of environmental degradation and death of true forest people who have the required traditional knowledge, without information being documented and evaluated (Plotkin 1990; Zuberi 1997),

- Because of their holistic nature, traditional remedies offer efficacy combined with safety more often than single cosmopolitan/conventional drugs (Varier 1996; Wynn 2001). The useful therapeutic principles are concentrated by the additive effects of multiple herbs ("synergy") and at the same time, the other herbs in the combination dilute any toxic effects in one herb. One treatment in the case of traditional medicine, applies for various ailments within the same victim (Toyang et al 1995),
- Wynn (2001), says, "until medical science can fully investigate the "miracles" attributed to herbs (traditional remedies) doubted as anti-cancer and anti-viral agents, we can state with some caution that traditional herbs are available to treat conditions against which conventional medicine is currently helpless. We have only a few safe, effective immune-stimulants in the conventional world, for example, but studies have shown that herbs such as *Echinacea*, *Astragalus*, *Ginseng*, and many others have immune-stimulating effects",
- The traditional herbal medicine help tonify body systems to help fight diseases, hence their consideration in most cases of ill health. This factor is not considered an aspect of disease treatment by modern, scientific medicine,
- The current western medicine and associated supplies are considered expensive, not embedded in local beliefs and concerns and not always in tune with animal welfare as it is the case with traditional veterinary medicine,
- There is a very high rate of increasing drug resistance with the currently used modern drugs,
- There is no harmful effects in most cases with the use of traditional medicine (Rangnekar 1997),
- The industrially produced pharmaceuticals are strongly believed by a bigger proportion of rural and peri-urban people to have more damaging adverse side effects and produce more toxic residues in food than the natural drugs prepared in traditional formats,
- With traditional medicine, there is locally available manpower, materials and equipments and good rapport in view of long association (Rangnekar 1997),
- The belief, trust and faith that Ayurvedic medicine comprises holistic properties which, when is used as treatment strategy, counteracts the adverse side effects of currently used conventional drugs (Majumdar 1989; Rangnekar 1997),
- Wilkinson (1984) reported that any conventional drug used in veterinary medicine has side effects whose adversity ranges from minor ones, which usually go unnoticed to more complex major ones which result into death (Kokwaro 1993),
- Traditional medicine is easily accessible by people of all levels, and sometimes not costing anything and can be obtained through barter trade which is very convenient for rural people (First author's personal experience in the field in Kenya),
- Traditional medicine has a lower cost for both its medicines and consultations than that of industrially produced pharmaceuticals (Rangnekar 1997),
- Although effective in many ways, industrially produced modern pharmaceuticals and facilities are out of reach of many rural and peri-urban people, and sometimes when available, they are in limited forms and their reliability not assured, thus automatically paving way for the use of ethnoveterinary medicine,

- Interdisciplinary research between ethnoveterinarians and orthodox veterinarians reveals that the traditional knowledge closely parallels orthodox veterinary medicine in many ways (Toyang et al 1995; Wynn 2001). For instance, Rwandan cattle raisers use a preparation made from *Neorautanenia mitis* to treat mange, a disease caused by mites that burrow under the animals' skin. Modern scientists have found out that this plant contained an ingredient that kills the mites. They were able to make an ointment for humans as an alternative to imported drugs that few rural Rwandans can afford (Martin et al 2001),
- Orthodox medicine which was, in its initial stages, welcomed and thought to provide solutions to every livestock health problems, has been adversely associated with the following limitations (Nuwanyakpa and Toyang 1994): -
 - inadequate manpower and logistical inputs,
 - scarce and erratic supply of veterinary drugs and supplies,
 - high costs of veterinary drugs and supplies,
 - poor communication facilities and other modern amenities,
 - counter-productive government policies, which do not promote the complementary utilisation of orthodox and indigenous knowledge systems, and
 - inadequate attention to the development of ethnoveterinary medicine and other indigenous knowledge systems,
- It is now a fact that sole dependence on orthodox medicine cannot solve the majority of livestock health problems. This was evaluated and outlined in Cameroon (Nuwanyakpa et al 1990),
- The traditional medicine works quickly and results into a more permanent cure (The ANTHARA Team 1997),
- The western researchers found out that working with ethnoveterinary medicine stimulates workable and sustainable community-based agricultural developmental projects that do not rely on donor support particularly in the Third world countries (Lawrence et al 1980; Mathias-Mundy and McCorkle 1989; McCorkle 1989a and b; Mathias and Perezgrovas 1997),
- It is also postulated that reviving indigenous knowledge within communities, and its transfer between communities, can provide opportunities for sustainable and cost-effective solutions (Mathias-Mundy and McCorkle 1989; Mathias-Mundy and Perezgrovas 1997),
- While working with the local communities, particularly pastoralists in Cameroon, Toyang et al (1995) found out that the parallel use of traditional and orthodox medicine is crucial for the two combined systems were found to: -
 - reduce sole dependence on expensive imported drugs and supplies,
 - explore the possibility of discovering new drugs,
 - increase in local manpower at a lower cost,
 - improve communication and contacts between livestock owners and veterinarians and hence provision and delivery of services, and
 - use more natural drugs which do not have the toxic effects on animals and the environment like the orthodox ones.
- Because of their illiteracy, local/native healers and animal owners are not in a position to distinguish between the various types of industrial medicines and understand their underlying principle of administration and action (Rathore et al

1997). They do not however encounter such kind of problems with their traditional preparations, and hence considered to be their best alternative

The way forward for ethnoveterinary medicine in today's world

The Pune Ethnoveterinary Conference held in India from 4th to 6th November 1997, comprehensively outlined the way forward for ethnoveterinary medicine in today's world (Mathias et al 1999). In the introduction, discussion and summary of this conference, ethnoveterinary medicine is described in depth and scope, the progressive steps in the composition, evolution and promotion of ethnoveterinary research and development (ER and D) specifically from 1980s to 1997 are comprehensively outlined and presented. They further summarized the presentation by clearly elucidating in great details how the future success of ER and D lies in the hands of a co-operation comprising all stakeholders with traditional, art, development, scientific research and academic knowledge to form interdisciplinary linkages. Many other participants of this conference and those drawn from previous workshops like the one organized in 1996 in Kenya (IDTG and IIRR 1996) and 1994 in Asia (IIRR 1994), had most of their views focused on how to integrate the entire ethnoveterinary knowledge into today's primary livestock healthcare delivery system in order to achieve a sustainable livestock production system in the rural and peri-urban communities of the world. This is the most stumbling block to go over in ethnoveterinary research and development and probably, this is where we are. In this section, a consolidated effort was made towards understanding the way forward for ethnoveterinary medicine in today's world. This section outlines some of the steps needed in order to put the rich traditional knowledge already identified, documented and evaluated to practical development work in respective local communities which contributed to its identification and assemblage and assisted in its evaluation and probably validation. From the foregoing discussion in this paper, the following was recommended to be considered for adoption: -

- Train and equip ethnoveterinary practitioners with modern veterinary techniques, practices and knowledge so as to make them be the 'frontline para-vets' to deliver in primary livestock healthcare systems at community level (Toyang et al 1995),
- Some advocates of ER and D however, suggest that ethnoveterinary research should focus less on treatments and medicines, but adopt a more systemic approach as its way forward (Rathore et al 1997),
- Be gender-sensitive. Women's traditional activities and knowledge is different from that of men and indeed, it is of great value and crucial in ER and D (Mwangi 1996),
- Make data orientation, gathering, analysis and applications locally centered and taking into account the realities of local conditions (Mathias-Mundy and McCorkle 1989). And by designing and jointly formulating community-driven projects and not donors-driven projects together, community-based problems will be adequately addressed to and appropriate solutions reached,
- Processes in ethnoveterinary research programs are key to coming up with sound solutions suited for different local communities. Ethnoveterinary research

- programmes should be planned so that the researchers make their project process-oriented rather than goal-oriented (Catley 1999),
- Develop and maintain release forms for individuals and organizations in ER and D,
 - Tie in as many geographical, species interaction, temporal and socio-cultural variables as practicals,
 - Keep the entire gamut of socio-political ties in mind in developing contacts-tribes, clans, municipalities, corporations, non-profits, state and federal agencies and specialists,
 - Develop Memoranda of Understanding (MOU) for clarity and trust purposes between all stakeholders in ER and D,
 - Develop methods and timelines for taking draft information back to communities for review and feedback, which would be integrated into products/reports for local, regional and wider use,
 - Look at models for protocols/guidelines developed by other agencies/organizations and borrow as appropriate to enhance appropriate output in ER and D,
 - Strengthen the traditional systems by orthodox veterinarians providing support, as well as certain critical services, such as vaccines and treatment of diseases not understood and properly managed by the stock raisers and ethnopractitioners. For instance, Martin et al (2001) described three circumstances leading to the selection of effective and appropriate practices for differing conditions from either orthodox medicine, ethnoveterinary systems or both, as follows: -
 - For acute, life-threatening infections and epidemics, modern medicine such as antibiotics will remain the first choice.
 - For common diseases and chronic conditions (colds, skin diseases worms, wounds, reproductive disorders, nutritional deficiencies, mild diarrhea etc.), ethnoveterinary medicine has much to offer and should be strongly considered as an alternative or complement to modern treatments. This is especially true because some antibiotics and other drugs have been overused, stimulating resistance among microorganisms and leaving dangerous residues in meat, milk and groundwater.
 - For problems such as ticks and trypanosomiasis, neither modern nor ethnoveterinary medicine alone provides a satisfactory solution. A combination of modern and local remedies and management practices might be the best.
 - Implement on- farm and - station testing of ethnoveterinary treatments for their efficacy evaluation and optimal standardization (Nuwanyakpa et al 1990; Marcus 1992; Martin et al 2001),
 - The western-trained researchers should understand, recognize, appreciate and learn to respect the medical traditional knowledge of other cultures and any results obtained from a given local community involved in an ethnoveterinary research programme, should be taken back to the same community with a reward and be made to benefit from its wider adaptation and use (Kasonia and Ansay 1997),
 - Encourage interdisciplinary research programmes to find effective traditional medicines and appropriate practices for differing conditions and adopt a common

naming system for both the remedies and diseases including the causal agents so that all stakeholders are at the same level of understanding the traditional knowledge (Martin 1996),

- Western researchers, animal keepers and owners, local healers, extension services and field staff of development projects, community-based animal health workers, private practitioners, staff at colleges and universities, and government officials, decision-makers, and development planners, should amicably joint hands together and promote the application of ethnoveterinary medicine through the commercialization of traditional medicines and practices (Mathias and Perezgrovas 1997),
- Since ethnoveterinary medicine has its roots embodied in ethnobotany, there is need to judiciously harvest, process, store, preserve and utilize the botanical preparations (Levy 1988; Lötschert and Beese 1983) and establish botanical gardens of particularly endangered medicinal plants (Gbile 1991; Spore 1992), so that a sustainable system of conservation and utilization of medicinal plants is achieved and maintained, thereby safeguarding, preserving and conserving biodiversity (Kasonia and Ansay 1997),
- Bibliography compilation and publication of literature review papers should be encouraged on competitive terms so as to update the stakeholders on current issues and the way forward for future research programmes in ER and D,
- As a medical resource for more than 80% of the world population, a scientific evaluation of these traditional remedies is crucial so that it can be made more homogenous, more efficient, less mysterious and more profitable to holders and users (Kasonia and Ansay 1997),
- Enhance education and multidisciplinary research programmes on ethnoveterinary medicine at all levels, particularly in Schools, Middle-level Colleges, Universities and National and International Research Institutions (Fielding 1997). Multi-disciplinary research programmes have the following advantages and roles: -
- It offers definitive diagnosis of diseases and many other conditions for many diseases share clinical signs (Ohta 1984; Wolfgang and Sollod 1986).
- Studies conducted by modern scientists/veterinarians alone, neglect other important features of folk veterinary medicine system such as magico-religious practices and diseases causation beliefs as it is exemplified in Ba's work (1982 and 1984) on Fulani's Livestock diseases and treatments in Mauritania.
- Multidisciplinary approach is very exhaustive and effective in collecting, evaluating, analyzing and documenting ethnoveterinary information (Grandin 1985; Martínez and Miguel 1988),
- They ensure accurate transcription of diseases' names and remedies into widely accepted phonetic system which is understood by all stakeholders (Martin 1996),
- The world governments and donor groups and agents such as IMF, World Bank, WHO, IFS, FAO, CIDA, IDRC, DANIDA, SIDA etc., should, morally, financially and physically give ER and D support and attention it deserves in its research and implementation interventions,
- Veterinary ethnopractitioners should, in their respective environments, be given an opportunity to explore and discover new techniques in their respective fields of specialization and where possible, organize themselves into relevant NGOs or

- local groupings. These groupings should be able to address all issues arising from their domain like it is the case in Cameroon (Toyang et al 1995),
- More interdisciplinary research on the efficacy, technical-know-how and socio-economics as well as cost-effectiveness is needed so as to be able to identify livestock health conditions or cases that require solely modern medicines, solely locally available traditional medicines and those that require complementation of the two types of medicines and how it should be done from a professional point of view (Martin et al 2001). By this strategy, all stakeholders such as: - western researchers, animal keepers and owners, local healers, extension workers and field staff of development projects, community-based animal health workers, private practitioners, staff at colleges and universities and government officials, decision and policy makers and development planners will begin using ethnoveterinary medicines on a regular basis and in specific areas and situations as directed,
 - Avoid ethnocentric top-down approaches, which pave way for development projects that are not feasible and sustainable under local conditions. Also, avoid participatory bottom-up approaches, which are time-consuming and not viable under the local conditions (Mathias-Mundy and McCorkle 1989),
 - Ethnoveterinary research should put more emphasis on first, documentation of the knowledge in new unexploited areas, and secondly, on learning procedures and methods as used in tradition knowledge. Little of this work has been done in many communities all over the world and currently, there is fear that this information has not been and is not being passed over to the future generations and hence, a lot of it if not all, may get lost forever without reaching the future generations,
 - Establish a central apex body for the formulation of policies and programmes and identification of educational and training needs of the system to popularize ethnoveterinary medicine (Ravindra and Rao 1997),
 - Setting up regional work stations for the collection and documentation of information on prevailing ethnoveterinary practices in collaboration with all stakeholders (Ravindra and Rao 1997; Akkara 1997),
 - In collaboration with relevant government departments/divisions, ethnoveterinary techniques and practices should be standardized and disseminated into areas with similar agro-climatic conditions through a well-designed extension system, thereby establishing a regulatory system of ensuring the quality of ready-made ethnoveterinary medicines produced for wider use (Ravindra and Rao 1997; Mathias 2004),
 - Identify critical situations in which the ethnoveterinary system would have to play a leading role with appropriate infrastructure facilities and related incentives (Ravindra and Rao 1997),
 - Translate the information from vernacular languages into official languages in order to have a fruitful debate in national and international fora with the objective of refining the techniques and also ensuring the geographical spread of such techniques, where feasible (Ravindra and Rao 1997),
 - In every geographical location, there should be a programme of studying the cultivation of hard-to-grow endangered ethnomedicinal plants (Mathias 2004),

- Governments must revive, promote and encourage community-based informal education, which embraces the values of community cultural and traditional life with a special focus on ethnomedicines of both livestock and humans,
- Establish improved databases on livestock population, veterinary institutions of the government, co-operative and private sector, practicing veterinarians and ethnoveterinarians (Ravindra and Rao 1997),
- Quantification of the veterinary infrastructure along the lines of the analytical approach from a wide range of resources including conferences, seminars, symposia and workshops (Ravindra and Rao 1997), and
- Development of appropriate legal frameworks with a view to protecting a country's ethnoknowledge and its overexploitation and ensuring that the source community benefits from any accruing benefits (Mathias 2004),
- Governments and states must come together and enact International and national policies and laws to guard against biopiracy and malpractices of bioprospecting into ethnoknowledge by world-leading multimillion pharmaceutical companies.

Conclusion

Traditional medicine has existed since pre-historic times and flourishes today as the primary form of human and animal medicine for perhaps as much as 80% of the world's population. Although the evolution and development of ethnoveterinary medicines have lagged behind that of human (Kofi-Tsekpo and Kioy 1998; Schillborn van Veen 1997), human ethnomedicines and ethnoveterinary medicines are complementary rather than separate fields (Lans 2001). Today, ethnoveterinary medicine remains an ethnoscientific resource that is yet to be tapped and has a far-reaching implication on the economic development and enhancement of veterinary health of particularly rural poor communities, which do not have access to modern medical services. Throughout the world, it has been recognized that for this dream to be positively realized and benefit these communities, there is need for official safeguards to be installed in the process to avoid abuse and misuse of ethnoveterinary knowledge, as identification and standardization for safety and validity of this knowledge continues, putting more emphasis on proven universal remedies. However, identification of beneficial and appropriate ethnoveterinary interventions is really a great challenge to the advocates of ER and D in the 21st Century. There is need also to facilitate a multilateral dialogue between local communities, NGOs, governments, donors, civil society and the private sector with the ultimate objective of mainstreaming indigenous/traditional knowledge into the activities of development partners and to optimize the benefits of development assistance, especially to the poor. However, this may be adversely affected by the multiplicity of factors determining the application, form and the amount of ethnoveterinary knowledge (Mathias and McCorkle 1996).

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