

Ethno-veterinary Medicine: A Concept for Sustainable Livestock Production



NATIONAL ACADEMY OF VETERINARY SCIENCES (INDIA)

G-4, A-Block, NASC, Dev Prakash Shastri Marg, New Delhi -110 012

October, 2015

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FOREWORD

It is my pleasure to present this booklet on 'Ethno-veterinary Medicine - A Concept for Sustainable Livestock Production' as the third official Policy Paper of the National Academy of Veterinary Sciences (India). This is the outcome of an 'Expert Consultation Meet' on the subject organized by the Academy in 2013. I congratulate the past president, Dr. M.P. Yadav, and the past members of his GC, for taking initiative to organize the said event on such an important subject that has led to this valuable publication.

I take this opportunity to sincerely thank and compliment the conveners and reviewers for their hard work in compiling this paper, and to the Editor for editing the manuscript, writing its preface and for final presentation of the booklet in an excellent manner.

Prof. Dr. K.M.L. Pathak

President, NAVS (India) and
Deputy Director General (Animal Sciences)
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PREFACE

Ancient Indians realized the prime importance of looking after the health of their livestock. The oldest written record for humanity dating back to Vedic period of about 2000-1800 B.C. is the Veda, which has supplied the most concrete evidence of veterinary art in antiquity. The Rig-Veda and many other treatises on veterinary science were written during the same period. The Indian System of Medicine—Ayurveda—includes both human medicine and veterinary medicine, indicating the fundamental oneness of two closely related subjects. This Indian traditional health care system of man and animals is based on scientific evidence and the knowledge on several healing herbs and natural plants used by our ancestors has withstood the latest scientific evaluations. The natural healing herbs are increasingly being used as alternatives to chemical products for improvement of animal health. The role of herbal additives is also being explored for enhancement of productivity of the livestock. The health, longevity and production of livestock can be improved with herbal animal health care products which have been clinically proven to be effective in various controlled clinical trials at veterinary colleges and research institutes. It also has now been fully realized that “many of traditional systems are sustainable, time tested and are in harmony with nature” Therefore, a serious attempt to revisit the significance of Veterinary Ayurveda is a recent development for livestock healthcare, in India and world over.

In view of these developments, the National Academy of Veterinary Sciences (NAVS-India) organized a brain storming expert consultation session on ethno veterinary Medicine on 16th October 2013 at Saharanpur in collaboration with Indian Herbs & Supply Company, wherein the Members of the Governing Council of NAVS (I) and other invited eminent scientists and participants from different parts of the country and NGOs like Anthra, made presentations, expressed their views with regard to recommendations to be made for the promotion of Veterinary Ayurveda in India, including research needs, veterinary curriculum, policy support, regulatory issues, etc. This Policy Paper is the outcome of a review of the important existing publications related to the subject, and the scientific presentations followed by penal discussions held at the aforesaid brain storming expert consultation sessions leading to the present recommendations.

Though this is the third policy paper being published by the Academy, it was planned to be the second. A vast subject matter was covered at the aforesaid ‘Brain storming expert consultation meet’ which was held only a couple of months before the then Governing Council of the Academy handed over the charge to the present one (2014-2016). The preparation and finalization of the draft manuscript needed a lot of additional work and consultations amongst the conveners and reviewers. Though there has been an unavoidable delay in its publication, the quality of the resultant Policy Paper speaks of the effectiveness of their joint efforts and inputs.

Prof. R.N. Kohli
Editor, NAVS (India)

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Ethno-veterinary Medicine: A Concept for Sustainable Livestock Production

Prologue

The magnitude of the problem of maintaining livestock (LS) health, reproduction and production, and improving breeds is a gigantic task considering the large LS population and the economic conditions of majority of livestock keepers in India. According to 19th Livestock Census-2012 India had a vast population of 512.05 million livestock comprising 191.90 million cattle, 109 million buffaloes, 65.06 million sheep, 135.17 million goats, 10.29 million pigs, 0.62 million horses/ponies, 0.19 million Mules, 0.32 million Donkeys, 0.40 million Camels, 0.29 million mithun and 0.07 million yaks, besides 0.592 million rabbits, 11.67 million dogs, 0.022 million elephants and 729.2 million poultry in the country (Anonymous, 2014). India ranks first in the world with respect to buffaloes, second in cattle and goats, third in sheep and fourth in poultry population.

The allopathic system of treatment has limitations of affordability due to costly medicines, their side effects, antibiotic resistance and toxicities for animals and man. The lack of proper treatment of various ailments may lead to significant reduction in animal production and substantial financial losses to livestock sector. Therefore, there is a need to adopt and also to find out a way to make available cost- effective and reliable remedies for use in livestock and poultry by utilizing the local resources to substitute the expensive medicines by alternate therapy. WHO has recommended to actively promote natural herbal medicines and also to initiate steps to conserve and cultivate medicinal plants.

Ethno-veterinary medicine (EVM), sometimes also called as *Veterinary Anthropology* or Traditional Veterinary Medicine, is defined as 'the holistic interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners, and social structures pertaining to the healthcare 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 with the ultimate goal of increasing human well-being via increased benefits from stock raising' (McCorkle, 1998). In general, EVM is not restricted to treatment of animal diseases alone, but also involves

a myriad of disciplines with all aspects of people's knowledge and practices in animal healthcare, productivity and performance that include their diagnostic and ethological understandings; preventive, primitive and therapeutic skills and treatment; and a wide range of health-related management techniques (Lans *et al.*, 2007).

Origin and evolution

The genesis of the term- ethno-veterinary medicine (EVM) and recognition of EVM as a legitimate field of scientific R & D are less than 30 years old (McCorkle, 1986). However, all over the world and down through ages, livestock and pet animal keepers have developed their own skills, ideas and techniques to treat the animals. Many of these traditional practices are centuries or thousands of years old (Lans *et al.*, 2007). It is now believed that the knowledge on care and animal healing practice merged during the Neolithic Period, when the 'sheep culture people' inculcated the civilized qualities like gentleness, caring, responsibility, compassion, non-violence and contemplation. These humane qualities generated an interest amongst primitive nomads in healthcare of man and animals resulting in acquisition of rudimentary skills of healing art (Schwabe, 1978), which was further sharpened with the growing social and economic values of different species of animals. Also the knowledge on behavioral, anatomical and physiological aspects of animals like cattle and sheep, which were used for divination and appeasement of gods in the ancient cultures, was very much crucial from religious point of view. Under these favorable circumstances, the traditional knowledge in the form of selective breeds and breeding, animal feeds and feeding, animal behavior, ritualism, herbalism, spiritualism, and ethno-epidemiology of livestock diseases originated in different ancient civilizations to raise superior livestock and keep them healthy for better production and performance. The traditional knowledge was generally transmitted verbally from one generation to other. However, the codified system also existed in the form of written scripts such as ancient books, stele, papyrus, clay tablets and other relics.

Ancient knowledge and practices

The development of ethno-veterinary knowledge has been guided by the changing concepts and beliefs about causes of diseases over the period since antiquity. The earlier theories emerged to define causes of diseases included *demonic theory* (spirituality); *divine wrath* (displeased Supreme Being or punishment of god); *metaphysical medicine* (occult forces beyond the physical universe- moon, planets, stars, earthquakes, floods and comets); *The Universe of Natural law and miasmata theory* (diseases caused by external forces including climate and geological factors and derangement of four

humors of body associated with four properties- heat, moisture, dryness and cold; local outbreaks occurring due to noxious air- miasmas); *the contagion theory* (diseases transmitted by contact or air-borne means being taken in via nose or mouth). The approaches to treatment and control of the diseases therefore changed concurrently with changing concepts in succeeding civilizations (Thrusfield, 2013).

Early man believed in *Demonic theory* of illness and considered disease as an outcome of supernatural power (witches, evil spirits). The treatment included placation, exorcism (forcible expulsion) and evasion through ritual ceremonies and by use of material objects (such as amulets, periapts, talismans, fetishes, totems) that can be carried out or suspended over buildings to keep away the evil spirit. Incantation and special people such as witch doctors were also used. However, despite use of these techniques, draft animals continued to die. The loss of valuable animals in the urban society resulted in development of the first stable period of veterinary medicine (c.6000 BC till first century AD), which was characterized by emergence of veterinary specialists such as Egyptian priest healers, and Vedic *Shalihotryas*, who founded the first veterinary hospitals (Thrusfield, 2013). By now the ancient healers also started using medicinal plants, minerals, organic compounds, zoo therapeutics and trepanning (removal of bone discs from the skull) to cure diseases.

Some basic biomedical knowledge emerged and early biomedical theories were propounded during this evolutionary period, particularly in the temple cities of Egypt. Dissections of sacrificed bulls and observations made by the Egyptian priests led them to rudimentary understanding of animal anatomy and physiology by analogy of human anatomy and physiology (Gordon *et al.*, 1995). The Edwin Smith Papyri belonging to ancient Egyptian period (c. 1700 BC) provide strikingly accurate description of circulatory system and other features of human anatomy with central role of heart in circulatory system. These scrolls mention use of several herbs such as senna, flax, oak gall, cedar, pinetar, bayberry, juniper, cyperus, myrrh, lettuce, saffron, watermelon and wheat (Wynn and Fougère, 2007). Majority of these herbs have been scientifically tested for their medicinal properties.

Veterinary knowledge in ancient India

The knowledge of veterinary medicine was also developing in other parts of ancient civilizations. Vedic sages (*Rishis*) in ancient India closely observed and recorded the behavior of sick animals and learned the self-medication traits of wild animals (*Zoopharmacognosy*). *Atharvaveda* (VIII, 7. 23) mentions '*a wild boar knows the herb which will cure it as does the mongoose*'. The ancient Indian healers used minerals, animal products and earth, besides magico-religious practices to cure

diseases. However, use of medicinal herbs was the mainstay of the therapeutic approaches. *Charak Samhita* (700 BC) provides details of 350 herbal medicines, some of which are proven in treatment of many diseases such as *visnaga*- Bishop's weed (*Ammivisnaga*) in asthma. *Ayurveda* prescribed use of herbs, diet, massage, detoxification and meditation for management of illness and listed over 2000 plants with medicinal properties. However, some elements of the *Ayurvedic* disease management approach such as purgation and vomiting, spirituality, meditation and higher thoughts were not possible in veterinary medical practice. Therefore, the uses of medicinal herbs and dietary supplements or dietary changes remained important veterinary *Ayurvedic* practice. The significance of herbs in ancient Indian veterinary care is underlined by the edict of King *Ashoka*, which stated that everywhere in the dominion of His Majesty King Priyadarshi, and likewise in the neighboring realms.... *every where on behalf of His majesty have two kinds of hospital been established; hospitals for men and hospitals for animals. Healing herbs medicinal for man and medicinal for beasts, wherever they were lacking have been imported and planted....*" *Arjuna* (*Terminalia arjuna*), coral swirl or *kutaja* (*Holarrhenaantidy senterica*), common-bur flower tree or *kadamba* (*Anthocephalus cadamba*), Indian copal tree or *dhupa* (*Vateria indica*), margosa tree or *neem* (*Azadirachta indica*), Asok tree or *Ashoka* (*Saraca asoca*), and Indian gooseberry or *aamla* (*Phyllanthus emblica syn. Emblica officinalis*) were commonly used to treat human and animal diseases. Surgical methods such as application of cautery, removal of foreign bodies and obstructions, surgical grafting, and treatment of fractures, dislocations, and fistula were also used by Vedic people for management of human and animal diseases. *Atharvaveda* (IV, 9.2) also mentions the benefits of different ointments for man, cows and horses.

The veterinarians in ancient India had considerable knowledge of animal anatomy, which was perhaps more precise than human anatomy. The procedure for animal dissection has been described in *Susrutasamhitā*. Veterinarians, like surgeons, had to be aware of vulnerable regions or vital points called *marma* (derived from Sanskrit *mru* or *murrand* is defined as *maryateitimarmani* i.e. 'there is a likelihood of death or serious health problem on inflicting injury on these points hence called *marma*'). These vital points are anatomically defined as the areas with high vascularity, joining points of tendons, veins, arteries, tendons and bones (joints). *Ayurveda* defines 107 such points in the human body. Animals may also have similar number of *marma* points. Veterinary profession was one of the most demanding professions and the state funded veterinary services were introduced during the *Mauryan* period. The first known veterinary hospital with 'indoor patient' facility was erected during the reign of Ashoka the Great (c. 269-232) (Swarup, 2003, Somvanshi, 2006, Iqbal *et al.*, 2008).

Interestingly, the ancient Indians associated sick rats with plague, the first suggestion of zoonosis (Thrusfield, 2013).

Present Knowledge

The role of ethno-veterinary medicine in livestock development is presently realized beyond dispute, especially in the developing countries. EVM is also viewed as a potential tool to overcome the side-effects of modern drugs and promote organic farming in both developing and developed nations. However, till the last quarter of the twentieth century, EVM and other ethno-knowledge systems were looked upon with suspicion and skepticism by the modern veterinary researchers and practitioners. Lack of scientific documentation and validation, concealment, distortion and improper dissemination of traditional knowledge, non-availability of proper raw material, declining herbal resources, slow therapeutic response in acute conditions, adoption of intensive livestock production system and lack of interest of younger generation in traditional livestock rearing have contributed to declining popularity of EVM practices. The veterinary academic curricula also ignored the significance of the traditional healing practices, which were popular till the advent of modern drugs. Despite all these odds, ignorance and skepticism, almost 80% of people in developing countries remained dependent on traditional methods of healing and livestock keeping.

Global recognition

The recognition and subsequent appreciation of people's traditional healthcare for animals was sparked off by a resolution adopted at the 30th World Health Assembly in 1977, urging interested governments to integrate their traditional systems of medicine into their national health delivery systems. There was also a growing realization amongst international livestock developers and policy planners that high-cost healthcare and husbandry practices borrowed from developed nations cannot cater to the needs of livestock raisers in developing countries. Misuses, abuses and side effects of modern drugs, shrinking financial resources, reluctance of private veterinarians to settle in rural areas, and growing consumer interest in healthful-organic-food products also provided important stimulus for emergence and recognition of EVM as a cost-effective animal healthcare option not only in developing countries, but also in the developed countries including the USA.

In the backdrop of these resolutions and realizations, traditional knowledge on animal healthcare and husbandry attracted scientific and academic attention during

1970s, gaining momentum from early 1980s. The term 'ethno-veterinary' was also introduced into academic and scientific cycles in 1980s (McCorkle, 1986). This period is rightly regarded as a revolutionary period of the present day EVM. Earlier, the information on EVM used to be hidden in grey literature, but a sizable body of literature has been published after this revolutionary period. This included a series of FAO reports documenting traditional (Indigenous) systems of veterinary medicine for small-scale farmers in India, Thailand, Nepal, Pakistan, Sri Lanka, Philippines and Tanzania and several books, status reports, research papers, scientific reviews, conference proceedings and workshop manuals (Wanzala *et al.*, 2005). An international conference on Ethno-veterinary Medicine: Alternatives for Livestock Development was organized in 1997 in Pune, India. A website (<http://www.ethnovetweb.com>) was also set up on ethno-veterinary medicine, to tell people around the world to keep their animals healthy and productive. Annotated bibliographies on EVM practices were also released.

Status in developing countries including India

EVM is recognized as a potential resource that can play pivotal role in grassroots development and poverty alleviation, empowering people by enhancing the use of their own knowledge and resources in the developing countries (Iqbal *et al.*, 2005). It holds specific value where allopathic veterinary medicines are often inaccessible or unaffordable for livestock owners. The majority of them continue to rely on EVM, even though they increasingly integrate modern veterinary approaches with their traditional practices (Mathias, 2007). The EVM programmes were initially supported by some national and international government and non-government agencies, notably Heifer International Project-US, Philippines based International Institute for Rural Reconstruction (IIRR), International Technology Development Group (ITDG)-UK, Germany's League for Pastoral People (LPP) and ANTHRA-India to cite a few. Bhartiya Agro Industries Foundation (BAIF) hosted the first International Conference on *Ethno-veterinary Medicine as an Alternative to Livestock Development* in 1997 in India at Pune with the support of World Bank and other agencies. From 1970s onward, an ever growing number of masters and doctoral dissertations on anthropology, and especially veterinary medicine addressed EVM (Lans *et al.*, 2007). During this period, several systemic studies, particularly on scientific validation of traditional phyto-medicines have been undertaken in Afro-Asian and Latin American countries with encouraging findings. An annotated bibliography on *Ethno-veterinary Research in India* was also published by ANTHRA in 2004.

In India, the traditional knowledge system comprises two distinct forms (i) the formal codified system of knowledge of disease and healing for both human and animals,

whose principles and practices were formulated and codified in the form of Ayurveda, *Sidhha* and *Unani-Tibb* and (ii) informal systems which evolved over thousands of years through innovation and experiences of communities and passed from generation to generation mainly through oral preaching. Yet, there are many similarities between these two forms and both the traditional knowledge are classified as '*Ethno-veterinary medicine*', which is being used by traditional healers and livestock raisers across the country. *Bakhrwal* in Jammu and Kashmir, *Darmior Dormi* and *Bhotiya* in Uttarkhand, *Raika* in Rajasthan, *Tharu* in Uttar Pradesh, *Adi-Yadavas* in central and northern India, *Raipipal* and *Charan* in Gujarat, *Santhal* in Jharkhand, *Konars* and *Toda* tribes in Southern India possess the great wisdom of traditional knowledge on animal husbandry and healthcare.

A large number of research programs on EVM were initiated by Indian Council of Agricultural Research (ICAR) through different institutions in the country to explore the possibilities of treating livestock suffering with diseases. Based on the preliminary studies ICAR supported interdisciplinary mega-projects involving several research and academic institutions to undertake scientific research, documentation, validation and dissemination of EVM knowledge and practices in the country. Some other organizations that are actively associated in EVM Research and Development (ERD) programmes in India include National Innovation Foundation (NIF), ANTHRA, Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), Honey Bee Network, Grassroots Innovation Augmentation Network (GIAN) and Foundation for Revitalization of Local Health Traditions (FRLHT).

Traditional husbandry practices and disease preventive measures

Besides treatment of sick animals, EVM also includes traditional animal husbandry practices such as housing types, grazing strategies, supplementary feeding, and calf-rearing. Many of these practices are still valuable for sustainable livestock development and to improve health and productivity of animals. For example, the *Fulani* herdsmen of Northern Nigeria had an annual migration pattern (transhumance) in search of water. The tracks are chosen carefully to avoid tsetse-fly-infected areas to control trypanosome infection in animals. Further, *Fulani* sometimes move their cattle upwind of infected herds to prevent FMD from spreading, and sometimes they move them downwind to expose the animals to infection, knowing that a mild case of the disease will not be fatal and will confer immunity (Leeflang, 1993). Similarly, the pastoral *Maasai* believe that wild beasts are silent carriers of Malignant Catarrhal Fever (MCF) and keep their animals away from wild animals during calving. This precautionary measure

is based on the deep indigenous knowledge of the course and the vectors of MCF (Jacob *et al.*, 2004).

The grazing practices evolved by many traditional pastoralist communities have been based on their observational experience and knowledge of selective foraging behavior of animals, including self-medication and avoidance of toxic plants by animals. These practices can be an efficient way to prevent worm infestations and plant toxicities. Farmers in West Java (Indonesia) raise their goats and sheep in sheds on stilts with a slatted floor, and feed them with cut fodder. As a result, the animals have few intestinal worms (Mathias 2001). Goat keepers in certain areas in Assam and Gujarat also keep their animals in traditional goat houses with raised platform. Interestingly, multitier goat houses have been developed commercially with raised floor at ground level and are becoming popular amongst commercial goat farmers in India. Besides these traditional practices and methods, sometimes magico-religious practices and idioms embody practical veterinary and management acumen. Treatments like feeding of saint-blessed salt are potentially effective for some maladies; and seemingly *outré* ethno-etiologicals like *evil winds* can dictate appropriate curative or preventive action (McCorkle, 1986).

Limitations and Strengths

In the modern era of evidence based veterinary medicine, many professionals question the usefulness, applicability and adaptability of EVM. It is argued that the traditional practices lack scientific evidences and may not be as effective as claimed. Some practices are harmful or not readily available. No doubt, many of the concerns relating to EVM practices are true to an extent, but like other systems of medicine, EVM has both limitations and strengths. The major limitations for EVM include:

- Ethno-veterinary medicines are often not as fast-working and potent as allopathic medicines. They may therefore be less suitable to control and treat epidemic and endemic infectious diseases. Further, effectiveness of EVM practices is questionable against emerging infectious diseases.
- Many 'so called effective EVM remedies' may be virtually ineffective and some are difficult to prepare or use under field situation.
- Majority of the traditional animal healthcare practices are unregulated and prone to be affected by abuse and quackery due to concealment, distortions and misleading claims. A large proportion of conventional practitioners, whether in human or animal health care, are therefore skeptical about the value of alternative practices.
- Certain EVM practices can be harmful if used improperly or without appropriate

knowledge and study. Even herbal preparations that are safe for use in some animal species may be toxic to others. For example, garlic which is recommended to reduce blood cholesterol in human can cause anaemia in dog. The white willow (*Salix alba*) preparations used for treatment of fever, rheumatic arthritis and headache in human can be fatal for cat, as felids cannot metabolize salicylic acid, a metabolite of salicin present in willow bark. Also, herbal products may be contaminated or adulterated. Herbal remedies prepared from misidentified, improperly collected, stored and processed medicinal plants or its parts may be injurious to health.

- Lack of documentation, inappropriate scientific validation and failure to disseminate and promote evaluated practices for field application adversely affect development and full utilization of EVM by the end users.
- The underlying science of EVM is poorly researched and understood.
- No formal degree/ diploma/ courses on alternative system are available in the academic curricula in many countries including India.
- The diagnosis of disease and identification of underlying cause are inadequate
- Depleting medicinal plant resources and seasonal availability of certain plants is making ingredients unavailable for preparing medicine.
- Rapid decline in experienced traditional healers and pastoralist communities. Young generation is not keen to use EVM, probably due to lack of information and interest or rural exodus.
- The evaluated veterinary traditional healthcare and management practices as well as herbal and holistic medicines are increasingly accepted as an important viable solution to address animal health problems not only in developing countries but in western countries as well. In general, though abuse and quackery exist, the application of traditional practices can be a pragmatic response in the areas without adequate veterinary services because of following advantages:
- Traditional knowledge has been generated and acquired by resource users in a diachronic (long term) time scale through observations and practical experience and are compatible with the local situation and less dependent on use of external inputs.
- In general, farmers are more comfortable to receive healthcare from known, trusted people (ethno-vets or extension specialists) who speak the same language and have better understanding of local conditions than those who are alien to their socio-cultural background.
- Most traditional practices are easy to adopt; whereas the modern technologies may or may not be compatible with the existing situation of the farmers and they may need external input and special skill for field application. For example, indigenous

knowledge based technology such as applying turmeric and coconut or mustard oil for treatment of wounds can be easily adopted and applied by local people; rather than using antibiotic and antiseptic treatment. Thus acknowledgment of value of traditional knowledge empowers local herders/farmers to try to solve disease problems of their livestock in a cost-effective way.

- EVM may be a potential tool to create better understanding between vets and extension personnel and communities. It can ensure proper health and productivity of animals in the areas where modern veterinary services are not readily available.
- Validated EVM practices, seems to be the most realistic choice for financially poor stock raisers who can neither afford nor have access to expensive high-tech modern healthcare practices.
- In emergencies or during fast spreading epidemics, traditional healers and their treatments may be more easily available with minimum expenses on transport and opportunity costs. There are fewer chances that expired or spurious allopathic drugs are sold to uneducated animal owners when EVM options are available for treatment of diseases.
- EVM research and developments have practical applications for cost-effective ways to control several economically important health problems such as internal or external parasitism, whether related to epidemiology, diagnostics and therapy, or to comprehensive disease control methods leading to integrated pest/disease management.
- Low-cost EVM remedies may ensure freedom from pain and diseases concerning welfare of animals with low market value (sheep, goat, poultry). Regardless of economic status of the stock raisers, these animals are likely to suffer for want of treatment involving high cost modern drugs.
- Proper application and adoption of EVM treatment approaches can provide a plausible answer to side effects of conventional drugs. These can limit any unnecessary use of antibiotics and other chemical drugs to overcome residue problems and the growing resistance of micro-organisms.
- The traditional animal healthcare and husbandry practices are well integrated with local environment and needs. Therefore, EVM practices and technologies are generally cost-effective, environment-friendly and sustainable to a specific area. For example, traditional herd- grazing and pasture management involve practices that do not over-exploit the natural carrying capacity of the land. There are several examples when substitution of some traditional practices has resulted in serious ecological impacts.
- EVM provides a highly intricate indigenous knowledge systems pertaining to animal husbandry that have been developed by several pastoral societies to 'shape' their animals according to their own specific breeding goals and animal utilization. For

example, the indigenous strategies for safeguarding and developing their valuable genetic resources include a variety of social mechanisms such as stock-sharing arrangements to prevent inbreeding and favoring birth of upgraded offspring; careful selection of breeding males with long list of favorable traits; castration to ensure that only best male reproduces and study the genealogy of their animals.

- Traditional practices constitute a potential knowledge resource for novel ideas and hypotheses. For example, understanding of zoo- pharmacognosy can provide ideas for developing grazing practices to prevent disease and discovery of medicinal use of plants as well as discovery of novel drug molecules. It is reported that 25% of conventional drugs and 120 pharmaceutical substances are plant-derived and 41% of the Pharmaceutical development has herbal origin. In 1990s, it was estimated that the value of global herbal medicines derived from plants discovered by indigenous people was nearly US\$ 43 billion.
- EVM practices may effectively prevent occurrences of diseases thereby avoiding financial loss in the form of treatment cost and production losses.
- Strengthening of EVM and recognition of the age-old status of healers (ethno-vets) give rise to a new approach referred to as 'participatory epidemiology', which promises to improve epidemiological surveillance in remote areas while simultaneously encouraging community participation in disease control to exchange professional information and also document their composite knowledge and experience.
- EVM may be an effective resource for community development and to protect the right of ethno-vets and owners of traditional knowledge at community level.
- EVM bridges the gap between natural resources and their human management for the future, as it characteristically promotes traditional practices and facilitates conservation, protection and propagation of floral biodiversity.
- EVM supports emerging agri-business opportunities such as organic animal husbandry and herbal farming. It is expected that the current global herbal market valued at US\$120 billion would raise to nearly US\$7 trillion by 2050. India ranks the world's second largest exporter of herbs (8.13% share) after China (28%).

In synthesis, traditional knowledge endowed with long-term practical understanding of the local ecology, livestock and wildlife ethology, and natural resources and so-forth may result in management interventions that are even more effective in preventing diseases thereby reducing the economic losses on account of treatment cost and production loss that may be associated following outbreak of diseases. The study of

treatment and practices in different cultures and between different bio-social groups within them may bring new ideas, techniques, and *Materia medica* for preventing diseases, and promoting or restoring health and welfare not only of animals

but also of people (Lans *et al.*, 2007). The proper documentation, validation and transfer of EVM practices for their use in field can provide much needed sustainable livestock development in developing countries. It can also address certain emerging environmental and biomedical issues associated with the use and abuse of modern drug technology. The EVM is also viewed as a potential tool to promote organic-farming, conservation of ITKs, and floral and faunal biodiversity.

Proper documentation, validation and transfer of tested technologies for field use

Use of any healing practice without scientific assessment may be harmful to the patients and may erode their confidence as well as of the professionals as well. Hence, proper documentation and validation of traditional knowledge are essential steps for appropriate blending of ITKs with modern technologies and to provide effective solutions to meet the global demand of cost-effective eco-friendly safer technologies for management of livestock health. These steps are crucial to revive confidence in EVM by establishing the scientific rationale of the traditional wisdom and knowledge in the present era of 'evidence based veterinary medicine'. Documentation and validation of ITKs are also important to address Intellectual Property Right (IPR) issues. Even the validated EVM practices remained confined to research publications, reports, books and conference proceedings. Further, the clinical evidences provided in support of EVM practices often lack in conducting controlled trials. Even the claims about therapeutic efficacies of herbs are mainly based on *in vitro* testing and supported by information derived from published literature without high quality controlled clinical investigations.

Regulatory issues

Universally accepted standard protocols for drug preparation, safety evaluation and drug dosage for EVM remedies are lacking. Regulatory system for veterinary herbal products is less developed. However, in Indian context, specific recommendations have been made in Section 3 (a) of Drug and Cosmetic Act, 1940 that "Ayurvedic, Siddha or Unani drug" includes all medicines intended for internal or external use for or in the diagnosis, treatment, mitigation or prevention of [disease or disorder in human beings or animals, and manufactured] exclusively in accordance with the formulae described in the authoritative books of Ayurvedic, Siddha and Unani Tibb systems of medicine, specified in the First Schedule]. The Good Manufacturing Practice of Ayurveda, Siddha and Unani drugs have been laid down in Schedule T of the Act. Following are the GMP guidelines under the schedule

- Raw materials used in the manufacture of drugs are authentic, of prescribed quality and are free from contamination;
- The manufacturing process as has been prescribed to maintain the standards with adequate quality control measures are adopted
- The manufactured drug which is released for sale is of acceptable quality.

To achieve the objectives listed above, each licensee shall evolve methodology and procedures for following the prescribed process of manufacture of drugs which should be documented as a manual and kept for reference and inspection. However, under IMCC Act 1970 registered Vaidyas, Siddhas and Hakeems who prepare medicines on their own to dispense to their patients and not selling such drugs in the market are exempted from the purview of Good Manufacturing Practices (GMP). The certificate of GMP to manufacturers of Ayurveda, Siddha or Unani drugs shall be issued to licensees who comply with the requirements of these GOPs. However, there are no separate veterinary qualifications in Ayurveda and Siddha system of medicine and authentic books are also lacking. Some pharmacopoeias like Pharmacopoeia Committee, Chinese Herbal Pharmacopoeia, United States Herbal Pharmacopoeia, British Herbal Pharmacopoeia, British Herbal Compendium, Japanese Standards for Herbal Medicine and The Ayurvedic Pharmacopoeia of India (API) have provided monographs stating parameter and standard of many herbs and some product(s) made out of these herbs. However, these pharmacopoeias deal only with herbal medicines without covering other ingredients of EVM. Also, researchers often envisage their own protocols to validate medicinal herbs leading in variability in end-results.

Safety issues

The current scientific standards demand that different healing practices should be evaluated for their safety in order to reduce potential hazards and to assess the risks and benefits ratio. Generally, traditional practices, especially herbs are regarded non-toxic and safe. Also, it is a common perception that traditional herbs can also be used with allopathic drugs without side effects. These are misleading concepts. The medicinal use of herbal extracts is plausible because they may contain pharmacologically active chemicals. However, several herbs contain toxic phyto-chemicals and the preparations made from such herbs may be harmful. Side effects are even associated with most frequently recommended household herbs such as garlic (heartburn, intestinal bloating), brahmi (skin rashes, headaches, sensitivity to sunlight), ginseng (nervousness, insomnia, headache and stomach upsets) and *Aloe vera* (hypokalemia). Further, contamination of herbs with pesticide, heavy metals and micro organisms due

to exposure of plants to environmental pollutants and agrochemicals for raising the plant, storing, processing and transportation has been reported increasingly and these foreign sources present a greater risk to the consumer. Investigation on safety and compatibility between two systems of medicine is an emerging area of research and should invariably be a part of validation trials.

Briefly, the standard procedure for validation and to test quality and safety of EVM remedies should preferably include (i) Identification of EVM ingredient(s), (ii) Botanical verification and authentication of herbal component, (iii) Safety and quality evaluation, (iv) Controlled clinical trials, (v) Isolation and identification of phyto-ingredient, (vi) Dissemination and reverse transfer of technology for field use.

Intellectual property right (IPR) Issues:

In the backdrop of growing global attention on EVM in the last few decades, protection of IPR and patenting of traditional knowledge, and the indigenous products used in it have become necessary. At present there is no patent protection for indigenous medicinal methods, while pharmaceutical companies commonly utilize the existing prior knowledge in the development of new patentable medicines. The indigenous knowledge, originating from local people over the centuries is used by other people for profit, without permission from and with little or no compensation or recognition to the knowledge holders. Many researchers also fail to obtain prior consent of knowledge holders to protect their right. With increasing bio-prospecting and bio-piracy trend, a need is felt to recognize the intellectual property rights (IPRs) of ethno-vets, pastoralists and other traditional domestic animal raisers. Intellectual property rights are not reconcilable with the traditional beliefs of indigenous people.

Article 8 (j) of our Constitution declares that 'respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote the wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.' In order to protect the right on traditional knowledge, a Traditional Knowledge Digital Library (TKDL) has been created by the Government of India in 2001. Presently, the library has repository of 1700 documented EVM formulations. India has also signed agreements with the European Patent Office (EPO), United Kingdom Intellectual Property Office (UKIPO) and the United States Patent and Trademark Office (USPTO) and has given access to TKDL to patent examiners at International Patent Office so as to prevent grant of invalid patents. Further, 'Protection of Plant Varieties and Farmers'

Right Act, 2001 has been enacted to provide an effective system for protection of plant varieties, the right of farmers and plant breeders to encourage the development of new varieties of plants, many of which have medicinal properties. Convention on Biological Diversity (CBD) and World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Systems (TRIPS) look into IPR issues at the international level. The major aim of CBD is 'sharing in a fair and equitable way the results and development, and the benefits arising from the commercial and other utilization of genetic resources'. The incentives and recognitions of ethno vets and other ITK holders pertaining to veterinary medicine and health care can also be an effective method for restoration of interest amongst younger generation to EVM practices. There is also need to protect bio-piracy of our indigenous breeds of cattle, buffalo and other livestock for their unique properties to withstand abiotic and biotic stress conditions, particularly heat, humidity, resistance to pests (ticks, lice) and infectious diseases, and adaptation to thrive in harsh tropical climate by developing suitable sui generis mechanism as has been done for plant varieties under PPV and FR Act 2001. It is required on priority.

Use of EVM

The full utilization of EVM knowledge depends on remoteness of the project promoting its use, a community's way of life, environmental conditions, availability of alternatives, recognition of the value of EVM, characteristics of the local versus introduced systems in terms of efficacy, costs, availability and cultural beliefs and feasibility, economic value and purpose of the animals kept, available information on proven effective indigenous drugs and practices and the type of livestock diseases and problems. EVM cannot replace conventional medicines completely. Most people favour integration of the two system of healthcare.

Trans-disciplinary approaches

Most Ethno- Research Development (ERD) programmes have been limited to a particular discipline and majority of studies have confined to evaluation of medicinal herbs for management of diseases or enhancing animal production but it comprises a myriad of disciplines, and all aspects of people's knowledge and practices pertaining to animal management, breeding, housing, feeding, health care, and welfare. Certain beliefs and rituals prevailing in the communities for generations may also have some scientific basis and are not deemed to be discarded without proper study. Therefore, holistic research approaches involving different disciplines of ethno science, ethology, ecology, etc. are warranted to achieve the fruitful outcome of such programmes.

Issues, options and way forward

Revival of interest in EVM and its recognition as a legitimate field of modern veterinary practices are almost four decade old. During this period, interest on EVM has grown considerably, and a plethora of literature has been published on EVM and related topics across the world. However, growing recognition has not yet translated into increased application of EVM in livestock and poultry development .There are certain concerns that need to be addressed in response to EVM.

Considering the importance of EVM in the present day scenario, National Academy of Veterinary Sciences (India), in collaboration with Indian Herbs, Saharanpur organized brain storming session on this issue on 16th October, 2013, wherein the participants of different parts of the country and NGOs like Anthra expressed their views and following recommendations were made for the promotion of Veterinary Ayurveda in India, including research needs, veterinary curriculum, policy support, regulatory issues, etc.

Recommendations

(I) Capacity Building of Veterinary Graduates in Herbal Medicine with Teaching and Training.

- **Veterinary Ayurveda/Herbal Medicine Syllabi for Veterinary Graduates:** Presently, there is no separate course on Veterinary Ayurveda or Veterinary Herbal Medicine in the existing VCI curriculum for BVSc and AH degree. The topic of indigenous drugs is covered very briefly and vaguely in the 'Chemotherapy Course'. As such, the veterinary graduates do not get much opportunity to acquire sufficient knowledge on different aspects deemed essential for effective use of Veterinary Ayurveda / Herbal Veterinary Medicine. It is therefore felt necessary that a course syllabus should be developed covering different aspects of Herbal Veterinary Medicine or Veterinary Ayurveda for inclusion in the curriculum of BVSc and AH for formal teaching and capacity building programme to promote effective application of Veterinary Ayurveda / Herbal Medicine in the modern veterinary practice with due emphasis on integrated approach.
- **Vocational Education:** Two short courses (TTT – Training the Trainers) for three months duration each be started under the aegis of IVRI, so that minimum 15-20 Veterinarians be imparted refresher course every year to enable them to apply and disseminate the information in the field. If found necessary, the experts / speakers from industry having practical experience on the subject be called for delivering lectures, as per requirement.
- **Post Graduation degree programme in Veterinary Ayurveda:** Imparting of MVSc degree in Veterinary Ayurveda should be taken up at a suitable institution

like IVRI, Izatnagar for strengthening of teaching and research in this important discipline.

(II) Strengthening of R & D in Veterinary Herbal Medicine

- **Strengthening of Research:** Presently the research on use of herbal medicine in veterinary practice is generally limited to clinical trials without phyto-chemical and phyto-pharmaceutical investigations, determination of bio-active molecules, studying of bio-chemistry and conducting toxicity trials. It is therefore necessary to revive, revalidate and refine the research on Veterinary Herbal Medicine.
- **Green House Gas Reduction:** Excretion of huge amount of ammonia and methane emission from ruminants at animal farms poses serious threat to the environment. The research on medicinal herbs can pave the way for development of useful supplements to minimize or control the production of ammonia and methane, thus minimizing hazards to the environment, and safeguarding animal and human health.
- **Ensuring Cost-Effective Animal Health:** In the present day economic conditions of livestock keepers, the health care of more than 500 million livestock in India needs to have an alternative system which may provide economic, safe, efficacious and handy treatment. The State governments and veterinarians need to be made aware of this aspect.
- **Herbal Product Development:** It needs priority following PPP model with the holistic approach including state of the art frontier research on herbal biomolecules for their therapeutic and health promoting properties, safety, standardization, clinical validation and efficacy. Quality control of herbal products should be mandatory as per established national / international norms.

(III) Policy and Development Issues

Short Term

- **Veterinary Ayurveda Course in BVSc and AH Degree:** Inclusion of separate courses on Veterinary Ayurveda or Veterinary Herbal Medicine in the existing VCI curriculum for BVSc and AH degree for teaching and capacity building program.
- **Establishment of Department of Veterinary Ayurveda:** A Department of Veterinary Ayurveda should be set up at IVRI for conducting research as well as taking up PG courses at MVSc and PhD level. Further, the research on bio-active constituents of medicinal herbs used for veterinary application be encouraged and documented under this department.
- **Library Enrichment:** The literature on important medicinal herbs and their bio-active constituents which are used in Veterinary practice should be made available

to all Veterinary Colleges for dissemination of information and for reference purpose in their libraries by the VCI.

- **Medicinal Plant Gardens:** Since there is need for extensive medicinal herb plant material for identification, research as well as preparation of medicines, it is suggested that all veterinary colleges should have a Medicinal Plant Garden including local diversity of the area.
- **Integration of Ayurveda with Veterinary Medicine:** During the XIIth Five Year Plan, Union Govt. of India is planning to link Indian System of Medicine with modern medicine. Though at present, it is being considered for human treatments, it is all the more important to link and integrate Veterinary Ayurveda with modern Veterinary Medicine.
- **Incentive for Promotion of Herbal Veterinary Medicine:** It is noticed that the practicing Veterinarians have now started using Ayurvedic veterinary medicine in the field along with the use of allopathic therapies to provide optimal health care to animals,. Thus, the Ayurvedic veterinary treatment is becoming increasingly popular in India and around the world. Moreover, for better growth and production in livestock and poultry, the practice of using antibiotics and other synthetic chemical products in feed is being discouraged. These have now been banned in EEC and many other countries due to human health hazards, residue problems, development of antibiotic resistance etc. Now, herbal products are being used largely as growth promoters in livestock and poultry as they are safe and show similar or better results. Use of herbal medicines will also promote organic livestock and poultry production.
- **Quality Assurance:** Registration with the Department of Animal Husbandry Government of India be made compulsory for manufacturing of all kinds of Functional Foods, Animal Feed Additives / Supplements including Herbal Animal Feed Additives / Supplements. The rules and regulations for ensuring quality of the products and proper manufacturing conditions may be developed and notified.
- **Incentives for Veterinary Ayurveda:** To promote effective application of Veterinary Ayurveda / Herbal Medicine in the modern veterinary practice to reduce environmental contamination and residues adversely affecting the health and well-being of human beings and animals besides polluting the environment, government should consider to provide adequate incentives.
- **Funding of Research:** Research on use of herbal medicine in veterinary practice is generally limited to clinical trials without phyto-chemical investigations, determination of bio-actives, studying of bio-chemistry and toxicity trials. It is therefore necessary to revive, revalidate and refine the research on Veterinary Herbal Medicine. Research on bio-active constituents of medicinal herbs used for veterinary application need to be encouraged and documented. Department of

AYUSH, GOI should make adequate provision for funding research projects in this emerging field.

- **Research Centre in Veterinary Ayurveda:** A separate Research Centre for Veterinary Ayurveda should be established at IVRI, Izatnagar with the mandate to conduct research as well as taking up MVSc and PhD courses in Veterinary Ayurveda.
- **Vocational Training for TOT:** Two short courses for three months duration each be started for training of trainers (TOT) under the aegis of IVRI with a minimum of 15-20 Veterinarians for refresher course in order to disseminate the information in this field.

Long Term

- **Establishment of Research Institute:** A National Veterinary Ayurveda Research Institute (NVARI) should be established under CCRAS (Department of AYUSH, Ministry of Health and Family Welfare). It should have the mandate to conduct research and education relating to Veterinary Ayurveda.
- **Coordinating Apex Body:** National Medicinal Plants Board (NMPB) should coordinate all activities and matters concerning to medicinal plants used for veterinary practices and also supports the basic policies/ programmes.
- **Good Agricultural Practices:** Development of Guidelines on Good Agricultural Practice (GAP) to ensure optimal yield in terms of both quality and quantity of medicinal plants/herbs intended to be used for health purposes (Defined under Schedule T).
- **Development of training tools:** Necessary tools, kit and video should be developed (jointly by ICAR-FAO) on Good Agricultural and Collection Practices (GACP) for medicinal plants for farmers' use.
- **Good Quality Tag (GQT) scheme** launched for medicinal plants jointly by NMPB and Quality Council of India should also be applicable for Veterinary Ayurveda.

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