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**ABSTRACT**

Ethno veterinary practices involve the traditional beliefs, knowledge, practices and skills pertaining to healthcare and management of livestock. The Indian subcontinent has rich ethno veterinary healthcare traditions and practices that are the products of decades of experiences of local people. Presently this treasure of knowledge has confined only in rural India. In sub urban areas of India, livestock holders find an integrated approach with the use of modern medicines along with the ethnic practices and knowledge. The traditional knowledge of veterinary health care practices and drug preparations is handed down orally from generation to generation, therefore, it is less systematic and less formulized. The present paper deals with a the status of herbal remedies for animal diseases in India and provides information on the botanical identity, specific preparations and mode of administration of the plant/plant's part for treatment of various disorders of livestock. Various references in published articles, books/book chapters available in print as well as online that had recorded the use of ethno veterinary practices performed by rural people were searched out and analysed to obtain data.

**KEYWORDS:** ethno veterinary, veterinary health care practices, livestock diseases etc.**Introduction of Ethno veterinary knowledge/practices/medicines**

Livestock production is found to be major source of income in rural and semi urban areas of India. The rural and tribal people are not easily accessible to modern veterinary services for their livestock. They are less economically healthy to cope with various bovine ailments therefore they depend upon their traditional knowledge of healing animals. It serves as a cheap, safe, biodegradable and easily accessible alternative to the synthetic and modern methods of disease control. According to the World Health Organization, at least 80% of people in developing countries depend largely on indigenous practices for the control and treatment of various diseases affecting both human beings and their animals. Livestock owners use a variety of plants and their products to form traditional medicines for primary health care treatment and maintaining animals productive. India is one of the world's 12 mega-diversity countries accounting for 8% of global plant genetic resources, therefore have a variety of plants to be the source of herbal medicines.<sup>[1]</sup> Ethno-veterinary medicine has evolved through observations, trials and errors, and passes from one generation to the next through verbal communication. Therefore, these practices are hardly documented and unfortunately largely lost, diluted and distorted. In order to understand its scientific justification, logic and to develop new concepts, it is of utmost need and importance to document the practices

involved in EVM. The traditional knowledge of animal healthcare practices requires great attention for pharmaceutical analysis to prospect new drugs in the concerned field.<sup>[2]</sup> In the present paper the documentation of ethnic practices used all over the country for livestock treatment has been done. The electronic and print databases were searched for the documentation of ethno veterinary practices.

**Components of Ethno veterinary Practices**

Ethno veterinary term does not only comprise of herbal and traditional medicines but it also constitutes informations, practices, beliefs, skills, tools and technologies, selection of breeds and human resources.<sup>[3]</sup> It was observed that almost all parts of the plant are used in the preparation of ethno veterinary medicines. These include bark, leaves, stem, flowers, roots, seeds, fruits.

**Pros & Cons of Ethnoveterinary medicine<sup>[4],[5]</sup>**

Pros	Cons
Affordable	Some effective plants are seasonal. Not available throughout the year.
Effective	Late Recovery
Easily assessable	Cannot be preserved for longer duration
Less risk of developing resistance	Non-Standardized dose
User friendly	
Eco friendly	

**Preparations of Ethno Veterinary Medicines (EVM)****Leaves**

The leaf decoction of *Cuscuta chinensis*, *Mucuna pruriens* is given to cattle to increase lactation.<sup>[6],[7]</sup> The leaves of *Bambusa arundinacea*, *Saccharum* sp. are fed to animal to expel placenta after delivery.<sup>[6],[9]</sup> Leaf decoction or paste of *Croton bonplandianus*, *Cassia occidentalis* is given to animal to cure other birth related problems.<sup>[2],[9]</sup> Leaf paste of *Aegle mermelos*, *Cassia fistula*, *Musa paradisiaca*, *Tamarindus indica* is mixed with ant hill soil or cow dung and applied externally to the back bone or femur bone or joints to treat Black quarter disease.<sup>[6],[10]</sup> Leaf paste of *Clerodendrum multiflorum*, *Moringa oleifera*, *Ricinus communis*, *Vallisneria spiralis* is applied topically over fractured bone for early healing and relieve in pain.<sup>[6],[7],[10]</sup> Leaves of *Adhatoda vasica*, *Bambusa arundinacea*, *Ficus religiosa*, *Justicia adhatoda*, *Vernonia cinerea*, mixed with jaggery or mustard oil and given to animal to cure cough, cold or pneumonia.<sup>[6],[7],[11]-[14]</sup> Leaf decoction, extract or just leaves of *Annona squamosa*, *Cassia fistula*, *Bryophyllum pinnatum*, *Holarrhena pubescens*, *Dolichandrone falcata*, *Cannabis sativa*, *Terminalia arjuna*, *Ricinus communis*, *Alysicarpus vaginalis*, *Tephrosia purpurea*, *Atylosia scarabaeoides*, *Careya arborea*, *Dalbergia sissoo*, *Clerodendrum viscosum*, *Argemone maxicana*, *Anthocephalus chinensis*, *Piper betle*, *Cardiospermum halicacabum*, *Cocculus hirsutus*, *Chenopodium album*, *Ficus racemosa*, *Psidium guajava*, *Bambusa arundinacea*, *Murraya koenigii*, *Vitex negundu*, are fed to animals to cure diarrhoea, dysentery and other gastro intestinal disorders.<sup>[6],[9],[10],[12],[15],[16]</sup> Leaf extract of *Gymnea sylvestre*, *Bauhinia variegata*, *Hyptis suaveolens*, *Ocimum tenuiflorum*, *Cissampelos pariera*, *Ficus benghalensis*, *Clematis heynei*, *Corchorus trilocularis*, *Leucas cephalotus* and latex of *Calotropis gigantea* is applied in the eyes of animals to cure various eye problems including cataract, redness in eyes, conjunctivitis.<sup>[2],[7]-[10],[15],[17]</sup> Leaf extract or decoction of *Adhatoda zeylanica*, *Andrographis paniculata*, *Barleria prionites*, *Anisomeles indica*, *Boerhavia diffusa*, *Nyctanthes arbor-tristii*, *Murraya koenigii* is given to animal to cure high temperature, weakness and dullness.<sup>[2],[6],[7],[10],[12],[13]</sup> Leaves of *Abutilon indicum*, *Barleria prionites*, *Cassia obtusifolia*, *Lawsonia inermis*,

*Nicotiana tabacum* are either fed or applied on hoofs of cattle to cure Foot Mouth disease.<sup>[2],[6],[7],[13]</sup> Leaf decoction or extract of *Cucurbita pepo*, *Cleistanthus colliniu*, *Albizia lebbbeck*, *Datura stramonium*, *Nicotiana tabacum*, *Haloptelea integrifolia* is applied on animal's body to remove ectoparasites including ticks and lice.<sup>[7],[8],[11]-[13],[16],[18]</sup> The leaves of *Azadirachta indica* mixed with jaggery or buttermilk is fed to animals to expel endo parasites.<sup>[2],[7]-[10]</sup> Leaf juice of *Allium cepa*, *Cryptolepis buchmanii* is applied externally on site of insect bite.<sup>[9],[14],[16]</sup> Leaf paste of *Adhatoda zeylanica*, *Amaranthus* sp, *Annona squamosa*, *Eclipta protasta*, *Cleome gynandra*, *Ipomoea carnea*, *Cucumis callosus*, *Acalypha indica*, *Crotalaria juncea*, *Dalbergia sissoo*, *Mucuna pruriens*, *Tephrosia purpurea*, *Prunus persica*, *Sida cordifolia* is applied on wound or burnt area of skin for healing.<sup>[2],[7]-[10],[13],[17]</sup> Leaves of, *Juglans curcas*, *Saccharum* sp are fed to animals to cure tympany.<sup>[9],[17]</sup> Leaves of *Trianthema portulacastrum*, *Morus alba*, *Aloe vera* are crushed and mixed with a little salt and applied to the udder and teats as an ointment in mastitis.<sup>[7],[9]</sup>

**Bark**

The bark is most commonly used in the treatment of diarrhoea, dysentery and other gastrointestinal disorders of animals including flatulence, constipation, loose motion etc. Bark decoction/powder of *Acacia nilotica*, *Spondias mangifera*, *Ervatamia heyneana*, *Butea monosperma*, *Abelmoschus ficulneus*, *Syzygium cumini*, *Alstonia scholaris* and *Ficus religiosa* is given to the animal for some days to cure the disorder.<sup>[2],[7],[8],[10],[13],[14]</sup> Bark paste of *Bombax ceiba*, *Cordia gharaf*, *Litsea monopetala*, *L. glutinosa* and *Machillus macranthais* is applied on fractured bone and tied with a cloth to relieve the animal from pain.<sup>[2],[6],[7],[14]</sup> The bark paste of *Terminalia chebula*, *Garuga pinnata* is applied topically on wounds for healing.<sup>[6],[9],[17]</sup> Bark decoction of *Syzygium caryophyllatum* and *Ficus glomerata* is also given in the treatment of tympany in animals.<sup>[7],[14]</sup>

**Flower**

Flowers of *Acacia nilotica*, *Calotropis gigantea* have been used as EVM for the treatment of gastrointestinal disorders.<sup>[8],[17]</sup> Flower of *Madhuca* sp. is used in bone fracture.<sup>[17]</sup> Flowers of *Leucus aspera* are mixed with leaves of *Momordica* sp., ragi powder and lemon juice is added and mixed with water and ground well and given twice a day orally to animal in fever.<sup>[12]</sup> The inflorescence of *Musa* sp. is burnt into ashes, mixed with cow's ghee & is applied externally to treat mastitis.<sup>[9],[17]</sup>

**Fruits**

Fruit juice, fruit pickle or dry fruits of *Cordia dichotoma*, *Luffa aegyptiaca*, *Citrus aurantifolia* and *Datura stramonium* is given to animal to cure cough, cold and pneumonia.<sup>[7],[11],[13],[19]</sup> Fruit paste or fruit powder of *Trigonella foenum graecum*, *Helicteres isora*, *Mangifera indica*, *Bombax ceiba*, *Cucurbita pepo*, *Aegle marmelos*, *Citrus aurantifolia* is given to animal to cure Diarrhoea, Constipation, Flatulence and Dysentery.<sup>[2],[8],[10],[11]</sup> Fruit

juice, extract or paste of *Citrus limon*, *Lycopersicum esculentum*, *Solanum virginianum*, *Pyrus pashia* is applied on eyes. Fruit of *Coccinia grandii* and *Cucurbita maxima* is also given in fever.<sup>[2],[14]</sup> Fruit decoction or powder of *Terminalia chebula* and *Piper longum* is applied on the affected area in Foot Mouth disease.<sup>[6],[7],[9],[10]</sup> Warmed tar-like oil extracted from the pericarp of the fruit of *Semecarpus anacordium* is applied on the hoof of the cattle suffering from FMD.<sup>[10],[12]</sup> Fruit of *Ananas comosus* is used to expel parasites in animals.<sup>[13]</sup> Fruit of *Cassia occidentalis* is given in poisonous bite.<sup>[2]</sup>

### Roots

Root decoction or extract of *Triumfetta pentandra* is given to cattle after delivery to cure problems like poor lactation, expulsion of placenta.<sup>[10]</sup> Roots of *Asparagus racemosus* are crushed and given to heal malformation of uterus.<sup>[10],[16]</sup> Root paste or decoction of *Peucedanum nagpurence*, *Abrus precatorius*, *Ficus bengalensis*, *Plumbago zeylanica*, *Cardiospermum halicacabum*, *Alternanthera sessilis*, *Curcuma domestica*, *Zingiber officinale* is given to cure dysentery and other related problems.<sup>[7],[9],[11]</sup> Roots of *Cayratia trifolia*, *Curcuma longa*, are given to cure FMD.<sup>[7],[14]</sup> Root paste of *Acorus calamus*, *Acalypha indica*, *Jatropha curcas* is applied or given orally to expel parasites.<sup>[7],[10],[13]</sup> A rhizome of *Colocasia esculenta* is crushed to pulp and applied externally as antidote of the stings of scorpion, honey bee and wasp.<sup>[10]</sup> Roots of *Butea monosperma* are crushed and given to goats with fodder in tympany.<sup>[9],[10]</sup>

### Seeds

The seeds of *Amaranthus caudatus*, *Crotalaria juncea* are fed to animals to treat problems related to poor lactation and uterus clearance.<sup>[6],[7]</sup> The seeds of *Cuminum cyminum*, *Brassica campestris*, *Vigna radiate*, *Oryza sativa* are known to heal in cold and cough.<sup>[8],[13]</sup> Seeds of *Coriandrum sativum*, *Trachyspermum ammi*, *Jatropha podogrina*, *Ricinus communis*, *Cicer arietinum*, *Sorghum vulgare*, *Curcuma longa*, *Cuminum cyminum*, *Balanites aegyptiaca*, *Piper nigrum* are given in gastrointestinal disorders.<sup>[6],[10],[11]</sup> Seed paste of *Semecarpus anacordium* is formed and given orally with butter during the treatment of FMD.<sup>[6],[10],[12]</sup> The seed paste of *Annona squamosa* is applied on body to remove ticks while the seed decoction of *Terminalia bellirica*, *Butea monosperma*, *Balanitis aegyptiaca* is fed to expel endoparasites.<sup>[8],[13]</sup> Seed powder of *Amaranthus viridis*, *Cuminum cyminum* and seed oil of *Brassica campestris* is given to cure tympany.<sup>[8],[10],[12]</sup>

### CONCLUSION

Plants are the most commonly used ingredients in the preparation of ethnoveterinary medicines. The plants belonging to different families have property of healing and preventing various disorders in livestock, thus are important part of ethnic medicines. There are some families of the plants which have wide range of their usage by the health practitioners. Such families are

Acanthaceae, Amaranthaceae, Apiaceae, Apocynaceae, Asclepideaceae, Caesalpinaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Liliaceae, Mimosaceae, Moraceae, Poaceae, Rutaceae, Rubiaceae, Solanaceae and Zingiberaceae. The plants belonging to these families are used commonly in combination or alone for medicine preparation.

All parts of the plants, including leaves, bark, fruits, flowers, seeds, roots and oil are used in medicinal preparations. Edible earth especially from ant-hills and limestones are commonly used in the preparation of ethnoveterinary medicines.<sup>[1],[20]</sup> Animal/Plant products like milk, butter, butter milk, vegetable oil, honey, salt, jaggery and vaseline are also used for ethnoveterinary preparations for their healing and preservative properties.<sup>[20]</sup> The most common forms of ethnoveterinary preparations are leaves/bark/roots decoction, extract, powder, ointment, paste etc.

Ethnoveterinary medicines are often not as potent as modern allopathic medicines, therefore can be less suitable to control and treat epidemic and endemic infectious diseases (e.g., foot-and-mouth disease, rinderpest, haemorrhagic septicaemia, anthrax, blackquarter, rabies). But for common diseases and more chronic conditions such as cough, cold, skin diseases, worms, wounds, reproductive disorders, nutritional deficiencies, and mild diarrhoea, ethnoveterinary medicine can be a cheap and readily available alternative to costly drugs.

Many drugs used in modern medicines are based on chemical substances that are derived from plants. The search for herbal alternatives is important in present scenario as unnecessary use of antibiotics and other chemical drugs have caused residual problems and resistance development in microbes/parasites/insects to drugs or chemicals use to kill them. Therefore exploration of local, ethnic treatments should be done on large scale followed by validation of promising practices. The validation can be done at several levels like by asking the local people to rank their traditional treatments according to their apparent efficacy. By conducting laboratory tests, monitoring the use of remedies in the field.

A considerable progress has been made in the ethnoveterinary sciences due to recent explorations of ethno botanicals so as to bring the ancient culture of animal healing in light.<sup>[16]</sup> A number of plants, plant extracts and constituents have been identified as having antimicrobial, antiticks, insecticidal, pesticidal, antiviral or antifungal activities and are often considered as immune enhancing.<sup>[21]</sup> Different studies have been made to understand various modes of action of these plant extracts and found that there are several ways by which they exert acaricidal property, some of them are preventing blood feeding, molting, fecundity and hatching of ticks eggs.<sup>[22]</sup> The efficacy of herbal extracts

have also been reported for anthelmintic property.<sup>[23]-[24]</sup> The scientific investigations should be conducted to ascertain the effectiveness of identified plant species in the treatment and control of diseases and parasites of livestock through discovery of new drugs.

A review on ethnoveterinary plants from Uttarakhand state of India reported that there are 364 plants used by people to treat animals as well as humans. The review also concludes that 26 plants out of 364 come under threatened flora.<sup>[25]</sup> Therefore, it is important to focus on the conservation of valuable plants which could serve as a source of future herbal drugs. It is also a matter of discussion that in a present scenario due to rapid socio-economic development, the valuable knowledge of plants would get faded away, therefore it is important to document the practices and use of plants by tribal and rural people so that the knowledge could not get vanished away.

#### Competing interests

The authors declare that they have no competing interests.

#### Author's contributions

Author Dilpreet Kaur collected and compiled the data obtained from various research papers/ books/ book chapters available online or print material. Author Kamal Jaiswal participated in design, coordination and helped to draft the manuscript. Author Suman Mishra designed, studied, analyzed, and concluded the manuscript. All the authors read and approved the final manuscript.

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