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Traditional veterinary medicines used by livestock owners of Rajasthan, India

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Livestock comprises a major part of Indian agriculture economics. Livestock owners in far- flung remote areas still depend upon plants and animal products for curing various veterinary ailments. This folk knowledge of ethnoveterinary significance has been identified by tribal and rural people through a process of experience over hundreds of years. The present paper deals with the plant as well as animal based crude drugs used in veterinary practices in tribal area of Rajasthan in India. Ethnoveterinary surveys of the study area yielded veterinary uses of 59 plants species belonging to 55 genera of Angiosperms. Twelve animal based ethnoveterinary medicines are also reported. The identified taxa are described by mentioning their scientific name, families, vernacular names, ethnoveterinary medicinal uses along with their mode of administration.

Keywords: Ethnoveterinary, Ethnobotany, Ethnozoology, Tribals, Folk knowledge, Rajasthan

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Traditional animal healthcare practices, also called ethnoveterinary medicine, provide low cost alternatives in situation where western type drugs and veterinary services are not available or are too expensive. These practices were developed and practiced through trial and error methods and deliberate experimentation and is therefore, less documented and not universally recognized and for these reasons, it has had no place in mainstream veterinary medicine. The discovery of uses of ethnoveterinary medicinal plants must have occurred in a number of ways, not only by the principal of trial and error mechanism but also through other ways which include; watching animals treat themselves by eating and rubbing themselves with special plants when ill and subsequent adoption of the same remedies, communicating and interacting with other traditional ethnoveterinary medical practitioners.

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 everybody. The knowledge is believed to be collectively 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. Since the domestication of animals, livestock owners have been concerned about the health of their animals. Civilizations all over the world had their herbal experts or doctors, being the local equivalents of trained doctors, who could help their fellows in adversities. In countries like China, India, Germany etc. manufacturing of herbal remedies or phytopharmaceuticals have evolved a long way with other traditional health practices and even the products are sold in country and exported.

Rajasthan is placed at sixth place in India from the point of view of tribal population. *Bhil, Meena, Garasia, Damor, Sahariya, Gujar, Kathodia, Dindor, Ahari, Raot, Parmar*, etc. are the important tribal sub-groups inhabiting the region. Rajasthan has a total livestock population of 3, 82, 840, 00 major part of which consists of cows, buffaloes, sheep and goats[1]. Tribals of this region have a predominantly livestock based economy. Some of the best breeds of cattle, goat, sheep camel, wild ass and even wild ungulates are found here. Though there is no authentic evidence of when and how plants and animals came into usage

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for curing the domestic animals, the tribals seem to be aware of it through generations. Access to and within the rural areas is extremely difficult during certain periods of the year making evacuation for medicinal treatment an unrealistic alternative. Therefore, rural people almost solely depend on traditional medicine; this knowledge of rural people with the traditional healing practices using wild plants and animal/product is now fast disappearing due to modernization and the tendency of younger generation to discard their traditional lifestyle and gradual migration to the mainstream. Therefore, an urgent need was felt to study and document this precious knowledge for posterity.

The information available on herbal veterinary medicines in India so far includes work of[2-6]. An account of botanical ethnoveterinary prescriptions in Rajasthan has been given by[7-10]. However, no comprehensive work has been done so far on the animal based drugs used by the tribal people of Rajasthan. In view of this, in the present paper, in addition to herbal veterinary medicines, animal based drugs used by the tribals of Rajasthan have been mentioned.

Methodology

A survey in the tribal areas of Rajasthan was performed 12 times during different seasons from 2005 -2007. We adopted ethnobotanical methods, anthropological methods[11], and participatory rural appraisal methods (PRA) [12-16] in the field. The ethnoveterinary information on wild plants and animals was collected through interviewing local informants. Before taking the interview rapport was made with one or two persons preferably the chief, guidance sought and contact with other tribals and PIC was taken from every informant. The local informants were medicine-men, men and women working in the field, priest, village headman and birth attendant above the age of 50 yrs. Generally two types of interviews were taken, firstly of individuals and secondly of groups. Of individuals, persons were selected at random on the way or entering a hut. To determine the authenticity of information collected during field work, repeated verification of data from different informants and in different times was done. Thus, only the specific and reliable information cross-checked with 13 informants has been incorporated in present study.

The plants were identified at the Herbarium of Forest Research Institute, Dehradun. Specimens are deposited in the Herbarium of Laboratory of Ethnobotany and Agrostology, Department of Botany, College of Science, M L Sukhadia University, Udaipur (Rajasthan). Information about the ethnoveterinary uses of plants are arranged alphabetically, each by its botanical name, followed by family, local name (in inverted commas) and collection number. The folk uses are described with details of the method of preparation, dosage and combination with other herbs, if any. The collected animal specimens were also identified with the help of experts in the Department of Zoology in the University. Information about the ethnoveterinary uses of animals and product derived from animals are arranged alphabetically, each by its zoological name, followed by it English name and local name. The folk uses are described with details of the method of preparation, dosage and combination with other products, if any.

Results and discussion

Tribals residing in the remote forest areas of South-East Rajasthan have an amazingly good understanding of the uses of medicinal plant parts and quantities needed, and the methods used in harvesting, processing, storing, preserving and utilizing medicinal plants to ensure good drug efficacy and to enhance the survival of plant germplasm. If the above procedures are poorly executed, plant resources may be over- exploited, which can lead to extinction of certain species. This means that the best results from medicinal plant preparations can only be obtained when the tribal and rural people are taught to judiciously harvest, process, store, preserve and utilize the preparations.

An extensive ethnoveterinary survey of tribal and rural area of Rajasthan yielded 74 ethnoveterinary medicinal remedies based on 58 Angiosperm plant species belonging to 55 genera and 37 families (Table 1) and 1 gymnosperm plant species hitherto not reported. The ethnoveterinary medicinal plants listed here are locally available and easily accessible and thus provide a cheaper treatment as compared to western drugs. The only limitation is the seasonal availability of certain plants, for which tribals have acquired different ways to preserve them for off-season uses. The Herbs are the primary source of medicinal plants in terms of the number of species (36.20% of total species) followed by shrubs and tree (Table 2). This is perhaps because they are abundant and/or weedy species that are frequently found in the forest, and it is believed that the more abundant

Table 1—List of Ethnoveterinary plants used in various ailments of animals

Name of the plant species	Habit	Local Name	Herbarium number	Plant part / parts used	Mode of administration
Abutilon indicum (Linn.) Sweet (Malvaceae)	Shrub	*Kanghi*	*EA 118	Seeds and leaves	1. Paste of about 20 gm is given orally once in a day for relief from constipation. 2. About 500 gm are given to the animal along with fodder to cure haematuria.
Acacia nilotica (Linn.) Del. sub sp. *indica* (Benth) Brenan (Mimosaceae)	Tree	*Babool*	EA 58	Thorns	Decoction of old thorns (2 to 3 yrs) is given to the animal for easy removal of placenta after delivery.
Achyranthes aspera *Linn. (Amaranthaceae)*	*Herb*	Modo kanto, Adhijhara	*EA 150*	*Rhizomes and Whole plant*	*1. Decoction prepared from about 100 gm roots of this plant and 50 gm rhizomes of* Curcuma longa, *is given once to camel to cure stomachache.* *2. Decoction of the whole plant is given to animals once for easy removal of placenta after delivery.* *3. Leaf juice is used as eye drops for curing opacity of cornea.*
Aerva lanata (Linn.) Juss. ex Schult. (Amaranthaceae)	Herb	*Chhoti Bui*	EA 429	Roots	Roots (100gm) are crushed and given orally as an antidote in snake bite.
Aerva persica (Burm.f.) Merrill. (Amaranthaceae)	Herb	*Safed bui*	EA 119	Flowers, roots, whole plant and inflorescence	1. Decoction of flowers (500 ml) is given to the animal in digestive disorders and to promote the discharge of urine in dysurea. 2. Decoction of roots (250 ml) is given orally to the animal to cure foot and mouth disease. 3. Extract of the whole plant (250 ml)is given to the animals when they start eating soil. 4. Decoction of inflorescence is used to wash hooves of animal suffering from foot and mouth disease.
Alangium salvifolium (L.f.) Wang. (Alangiaceae)	Tree	*Ankol*	EA 114	Roots and Leaves	1. Roots (50 gm) are ground with 500 ml of buttermilk and given to the animal once in a day for three days as an antidote to dog bite. 2. Paste of 100 gm leaves of is given orally to the animal with water to cure malarial fever as well as to treat enlargement of liver.
Allium sativum Linn. (Liliaceae)	Herb	*Lahsun*	EA 127	Bulbs	Paste is prepared by mixing crushed bulbs with two eggs of hen and 1.5 L of milk and given to the animal to treat impaction and lumbago.
Anisomeles indica (L.) O. Kuntze (Lamiaceae)	Herb	*Ghabro*	EA 141	Whole plant	Decoction of the whole plant (200gm) is given to buffalo to treat flatulence as well as leucorrhoea.
Anogeissus latifolia (Roxb. ex DC) Wall. ex Guill. & Perr. (Combretaceae)	Tree	*Dhawada*	EA 105	Bark	Bark decoction of handful of bark is given to the animal twice a day for 2 days to treat fever.
Aristolochia indica Linn. (Aristolochiaceae)	Shrub	*Gorisal*	EA 511	Roots	About 10 gm root powder is given along with chapatti made up of wheat, thrice a day for 4 days to treat fever in cattle.
Azadirachta indica A. Juss (Meliaceae)	Tree	Neem	EA 21	Leaves	Leaves of *Azadirachta indica* are given as fodder to the animals to treat leucorrhoea.
Boswellia serrata Roxb. (Burseraceae)	Tree	*Salar*	EA 124	Barks	Decoction of bark is given to the animal in arthritis and also in indigestion, windiness and flatulence.

(*Contd.*)

Table 1—List of Ethnoveterinary plants used in various ailments of animals (*Contd*.)

Name of the plant species	Habit	Local Name	Herbarium number	Plant part / parts used	Mode of administration
Calligonum polygonoides Linn. (Polygonaceae)	Shrub	*Phog*	EA 152	Whole plant	Extract of whole plant is given to treat constipation. Decoction of whole plant is given to treat urinary problems.
*Calotropis procera (*Ait) R. Br. (Asclepiadaceae)	Shrub	*Akra*	EA 214	Latex	Mixture of 50 ml Hydrochloric acid, 50 ml latex of *Calotropis procera* and 50 ml latex of *Mangifera indica* is used as an antidote to scorpion bite.
Capparis decidua (Forssk.) Edgew. (Capparaceae)	Shrub	*Ker*	EA 123	Stem	Syrup is made by mixing of ½ kg shoots of *Cissus quadrangula*, ½ Kg ash of stem of *Capparis decidua* and roots of *Ziziphus jujuba*, ½ Kg Jaggery and milk. This is given to the cattle once in a day, daily for early healing of fractured bone.
Catunaregam spinosa (Thunb.) Tiruv. (Rubiaceae)	Shrub	*Kharedi*	EA 281	Whole plant	About 500 gm of whole plant, 50 gm of jaggery and 25 gm of dried rhizome powder of *Curcuma longa* is given to animal as a fodder to treat diarrhoea.
Celosia argentea Linn. (Amaranthaceae)	Herb	*Garkha*	EA 50	Roots	Root juice of *Celosia argentea* (100ml) mixed with extract of fruits or leaves of *Tamarindus indica* is given orally to treat food-poisoning.
Citrullus colocynthis (L.) Schard. (Cucurbitaceae) ‘	Climber	*Gad-tumba*	EA 164	Roots	1. Decoction of roots is given to the animal twice a day to cure constipation. 2. A mixture of 20 gm honey, 20 gm juice of roots of *Citrullus colocynthis*, 20gm mustard oil is applied internally for easy opening of uterus during delivery.
Cocculus pendulus (Forst.) Diels (Menispremaceae)	Climber	*Pilwan*	EA 168	Stem	Ash of 100 gm stem of *Cocculus pendulus* mix with 100 gm cow’s milk fat and given to the animal to treat mastitis.
Citrus medica (Rutaceae)	Shrub	*Nimbu*	EA 208	Fruits	Juice of 10 lemons is given with 750gm sugar to induce lactation.
Cleome gynandra Linn. (Cleomaceae)	Herb	*Safed hulhul*	EA 447	Leaves	Paste of leaves of *Cleome gynandra* is applied locally twice a day to treat eczema.
Cleome viscosa Linn. (Cleomaceae)	Herb	*Hulhul*	EA 449	Seeds	Paste of about 50 gm seeds of *Cleome viscosa* is given with water through drenching tube, thrice a day for relief in diarrhoea and fever.
Corallocarpus epigaeus (Rottl. & Willd.) Hook. f. (Cucurbitaceae)	Climber	*Mirchia-kand*	EA 227	Tuber	About 250 gm of paste prepared from one tuber of *Corallocarpus epigaeus* and whole plant of *Tinospora cordifolia* is fed to the suffering animal twice a day for 3 days to treat tonsillitis.
Cordia dichotoma Forst. f. (Ehretiaceae)	Shrub	*Goonda*	EA 215	Leaves	Mixture of juice of leaves of *Cordia dichotoma* and honey is applied over the mouth of the animal to cure swelling during foot and mouth disease.
Crotalaria burhia Buch Ham. ex Benth (Fabaceae)	Herb	*Jhunda*	EA 489	Whole plant	1. Decoction of whole plant is given to cure urinary problems and also for easy removal of placenta after delivery. 2. Extract of whole plant is given to cure constipation.
Cuscuta reflexa Roxb. (Cuscutaceae)	Climber	*Amar-bel*	EA 128	Whole plant	One kg whole plant of *Cuscuta reflexa*, 1kg leaves of *Datura innoxia* are boiled in one litre of mustard oil. Massage of this oil is given to the animal to get relief from lumbago and rheumatic pain.

(*Contd*.)

Table 1—List of Ethnoveterinary plants used in various ailments of animals (*Contd.*)

Name of the plant species	Habit	Local Name	Herbarium number	Plant part / parts used	Mode of administration
Dalbergia sissoo *Roxb. (Fabaceae)*	*Tree*	Tali	*EA 169*	Leaves	*Infusion of 2 Kg leaves is given to camel to cure effects of sunstroke. Leaves of this plant are soaked overnight in water and in the morning and soaked leaves are given orally to the camel to cure dysurea and heat in the body.*
Desmostachya bipinnata *(Linn.) Stapf. (Poaceae)*	*Herb*	Dab	*EA 625*	*Whole plant*	*Decoction of whole plant is given to buffaloes to treat flatulence.*
Digitaria adscendens (Poaceae)	Herb	*222*	EA 62	Seeds	Mixture of seeds of *Digitaria adscendens*, *Tribulus terristris*, *Pedalium murex* and crushed fruits of *Cucumis melo* and *Citrullus lanatus* is given to the animal to treat constipation.
Enicostemma axillare(Lam.) Raynal. (Gentianaceae)	Herb	*Naame*	EA 187	Leaves	Leaves About 50 gm leaves are given with fodder to the young animals for five days to treat fever.
Ephedra ciliate Fisch. & Mey. ex C.A. Mey. (Gnetaceae)	-	*Oont phog*	EA 600	Whole plant	Decoction of about 5 Kg whole plant is given to the animal to cure constipation.
Euphorbia hirta Linn. (Euphorbiaceae)	Herb	*Dudhi*	EA 140		1. Paste of about 25 gm whole plant is given with water through drenching tube once only to treat diarrhoea. 2 .About 10 gm leaves of *Euphorbia hirta* are given along with fodder once in a day for 2-3 days to cure fever. 3. Paste prepared from the leaves of this plant and *Cynodon dactylon* is given to the animal with milk to treat diarrhoea.
Euphorbia triculii Linn. (Euphorbiaceae)	Shrub	*Danda thor*	EA 516	Latex	Latex is applied locally to treat skin diseases like dermatitis, eczema, etc.
Ferula asafoetida Linn. (Apiaceae)	Tree	*Hing*	EA 539	Resin	1. Ten gm '*asafoetida*' is given to the animals once in a day for three days to cure infection of nematode in intestines. 2. Resin powder is given with milk to treat flatulence.
Ficus religiosa Linn. (Moraceae)	Tree	*Pipal*	EA 176	Leaves	Extract of about 5 kg leaves of this plant is given orally to the buffalo to cure dysurea and haematuria.
Gloriosa superba Linn. (Liliaceae)	Climber	*Kalgari*	EA 222	Tubers	Paste of about 250 gm tubers is applied over hooves of the animal suffering from foot and mouth disease.
Holoptelea integrifolia (Roxb.) Planch. (Ulmaceae)	Tree	*Bandar bati*	EA 144	Leaves	Paste of leaves of *Holoptelea integrifolia* is applied over the affected part to treat eczema.
Leptadenia pyrotechnica (Forssk.) Decne. (Asclepiadaceae)	Shrub	*Kheemp*	EA 237	Tender shoots	Tender shoots are cut into small pieces and mixed with fodder for ouster induction.
Leucas aspera *(Willd.) Link (Lamiaceae)*	*Herb*	Dargal	*EA 147*	*Whole plant*	*Bolus prepared from mixture of 10gm rhizome of* Piper longum *(*Choti pipli*) and 20g whole plant of* Leucas aspera *is given to treat fever.*
Leucas cephalotes *(Roth) Spr. (Lamiaceae)*	*Herb*	Khumbi	*EA 567*	*Whole plant*	*Whole plant is given to diseased sheep as a tonic for overall strength.*
Melia azedarach Linn. (Meliaceae)	Tree	*Bakayan*	EA 167	Leaves	About 25-30 gm leaves is given to the animal once in a day for 3 days for removal of internal parasites. Excess quantity is poisonous.

(*Contd.*)

Table 1—List of Ethnoveterinary plants used in various ailments of animals (*Contd*.)

Name of the plant species	Habit	Local Name	Herbarium number	Plant part / parts used	Mode of administration
Nicotiana tabacum (Solanaceae)	Shrub	*Tambakhu*	EA 82	Leaves	Mixture of 10gm dried leaves of tobacco, 50gm Sodium carbonate and 500 ml mustard oil is given to the animal to treat flatulence.
Ocimum americanum Linn. (Lamiaceae)	Shrub	*Bapchi*	EA 247	Seeds	Paste of 50 gm seeds of *Terminallia catappa*, 50 gm '*jhadi's lac'*, 10 gm *Foeniculum vulgare*, 10 gm *Ocimum americanum* is given to the animal with fodder to cure heat in body and leucorrhoea.
Ocimum sanctum Linn. (Lamiaceae)	Shrub	*Tulsi*	EA 364	Leaves	Paste of about 10 gm leaves of *Ocimum sanctum* is applied over the skin to cure scabies.
Ocimum sanctum Linn. (Lamiaceae)	Shrub	*Tulsi*	EA 364	Leaves	Mixture of paste of 20 leaves of *Ocimum sanctum*, 20 ml honey and 50 ml urine of a calf is given to the animal orally to treat cancer. This treatment results in weight gain and good health of animal.
Pedalium murex Linn. (Pedaliaceae)	Herb	*Dakhani gokhru*	EA 226	Whole plant	Whole plant is fed to the animal for its cooling effect during summers.
Plumbago zeylanica Linn. (Plumbaginaceae)	Shrub	*Chitrak*	EA 253	Seeds	Seeds decoction of about 250 gm seeds of *Trachyspermum ammi* and 2 - 4 leaves of *Plumbago zeylanica* is given to the animal once only to treat flatulence.
Rhus mysurensis G. Don. (Anacardiaceae)	Shrub	*Dansarae*	EA 495	Leaves	Leaf paste is applied over the body against allergy / rashes / eczema.
Sida ovata Forsk. (Malvaceae)	Herb	*Khariti*	EA 454	Whole plant	Whole plant is given with fodder to the animal followed by hard work as a pain reliever.
Soymida febrifuga (Roxb.) A. Juss. (Meliaceae)	Tree	*Rohin*	EA 275	Bark	Bark of *Butea monosperma* and *Soymida febrifuga* (100 gm each) is crushed with 500 ml of buttermilk. This dose is given to the animal suffering from diarrhoea thrice a day till the animal recuperates.
Spermacoce stricta L. (Rubiaceae)	Herb	*Agio*	EA 497	Whole plant	Decoction of the plant is given to the animal to cure vulvo- vaginal- uterine- prolapse.
Tecomella undulata (Sm.) Seem (Bignoniaceae)	Tree	*Rohida*	EA 302	Bark	Bark oil is applied locally to cure rashes on skin.
Terminalia bellirica (Gaertn.) Roxb. (Combretaceae)	Tree	*Baheda*	EA 262	Fruits	Pulp of about 750 gm fresh fruits or about 500 gm of dried fruit- powder is given orally twice a day for at least 7 days for relief from diarrhoea.
Terminalia chebula *Retz. (Combretaceae)*	*Tree*	Harad	*EA 580*	*Fruits*	*About 50 gm* harad*, 50 gm rock salt, 50 gm seeds of* Trachyspermum ammi, *25 gm neero, 25 gm* Elytaria *(*Chhoti ilaychi*), 50 gm Sodium bicarbonate and 500 gm jaggery is mixed and bolus of 150gm of this mixture is given orally for three days to treat gastro intestinal disorders and also for good appetite.*
Trianthema portulacastrum Linn. (Aizoaceae)	Herb	*Hato*	EA 545	Leaves	Leaf paste of 250 gm leaves and 10 gm seeds of *Piper nigrum* is given orally to treat diarrhoea.
Tridax procumbens L. (Asteraceae)	Herb	*Larde olapsi*	EA 143	Leaves	Infusion of 100 gm dried leaves is given orally to treat diarrhoea.
Withania somnifera (L.) Dunal. (Solanaceae)	Shrub	*Akshan*	EA 81	Tubers	Decoction of 1 kg tubers and 2 L 'Sesamum' oil (seed oil of *Sesamum indicum*) is given to the cattle to treat lumbago.

(*Contd*.)

Table 1—List of Ethnoveterinary plants used in various ailments of animals (*Contd.*)

Name of the plant species	Habit	Local Name	Herbarium number	Plant part / parts used	Mode of administration
Zingiber officinale Rosc. (Zingiberaceae)	Herb	*Sonth*	EA 282	Tubers	1. Mixture of 250 gm milk fat, 10 gm dried tubers powder of '*sonth'* and 10gm black pepper is boiled and then cooled and given to the animal to cure stomachache. 2. Bolus prepared from the mixture of dried *Zingiber officinale*, *Allium sativum* and one egg of hen is given to the animal to cure pneumonia and paralysis.
Ziziphus mauritiana Lamk. (Rhamnaceae)	Shrub	*Ber, Pala jhadi*	EA 283	Seeds	1. Seeds are grinded and fed to buffalo to prevent vulvo- vaginal- uterine prolapse. 2. Sesamum-oil (2 L), ½ Kg roots of this plant, 100 gm Ammonium chloride, 2 Kg sugar and 100gm clay is mixed with wheat husk and water and kept in an earthen pot for 3 days and 750 ml of it is given orally to the animal once in a day, daily as a galactogogue as well as to induce lactation in cattle. 3. Mixture of 50 gm lac of this plant, 10gm seeds of *Foeniculum vulgare*, 10gm seeds of *Ocimum americanum* is given with fodder to treat leucorrhoea and heat-stroke.

*EA: Ethnobotany & Agrostology Herbarium number

Table 2—Medicinal plants arranged by the growth forms

Life form	Total species	Percentage
Herbs	21	36.20%
Shrub	18	24.13%
Tree	14	31.03%
Climber	5	8.6%
Total	58	100%

a plant is, the more medicinal virtues it may possess[17]. The ease with which bioactive compounds can be extracted are also factors that contribute to the preference of herbs.

The plant parts used for medical preparations are bark, flowers, fruits, leaves, rhizome, roots, sap, seeds, stems, thorn and tubers. In some cases whole plant is utilized.

During the survey it was noted that the tribals in the study area in addition to plants, use some animals both vertebrates and invertebrates and their by products (curd, urine, milk, excreta, hive, etc.), as source of curative, protective and preventive medicine. In the present paper 17 remedies based on 16 animal/ animal product has been reported (Table 3).

Tribals use these medicines against various ailments to treat their suffering animals. There is no specific treatment for a particular type of animal e.g. cattle, goats, sheep, camels or horses. Same treatment is applied to different animals but the dose depends on body weight of the animal. Wherever there is a medicine specific to a particular animal, it has been specially mentioned. For example, in case of camel remedies prepared from root of *Achyranthes aspera* is used to cure stomachache.

There is a certain overlap between plants used for human and animal medicine such as plants like *Alangium salvifolium* (antidote and fever), *Enicostemma axillare* (fever), *Euphorbia triculii* (eczema), *Melia azedarach* (vermifuge), *Phyllanthus fraternus* (fever) are used as medicine for same diseases in humans4 as well as animals although the dose in such cases varies greatly. This may be possible as a result of tribal's tendency to try human medicines on animals. Such medicines are found to be equally useful in veterinary diseases.

Ethnoveterinary medicines can provide an opportunity of new drug research for human use also. For example, Rwandan cattle raisers used a preparation made from *Neorautanenia mitis* to treat mange, a disease caused by mites that burrow under the animal's skin. Scientists found that this plant contained an ingredient that kills the mites. They were able to make an ointment for humans as an alternative providing low cost alternative to imported drugs 18. Therefore, the plants reported here may be clinically tested for their possible use in human medicine also.

Table 3—Enumeration of animal/ animal product based remedies

S. No.	Zoological name	English name and Local name	*Mode of administration*
1.	*Acrida exaltata*	(Walk.) '*Tiddi*'	*Two to three grasshoppers along with* chapatti *(Bread) or fodder are fed to the animal for ouster induction. The animal comes into heat within 15 days of this treatment.*
2.	*Bos bubalus*	(Buffalo) '*Bhains*'	Skull of a dead buffalo is kept at home. It is boiled in water and such water is given to the camel to cure flatulence and lumbago.
3.	*Camelus dromedaries*	(Camel) '*Oont*'	Skull of dead camel is burnt to prepare ash. About 100 gm of this ash is mixed with 400 gm oil of *Papaver somniferum* and given orally through drenching tube once a day for six days to treat lumbago in cows. Skull of a dead camel is kept at home. It is boiled with water and such water is given to the buffalo to cure flatulence and lumbago.
4.	*Capra capra*	(Goat) '*Bakari*'	Paste of mixture of excreta of she goat and leaves of *Cassia auriculata* in equal ratio is applied as a dressing on wounds and bandaged to treat haemorrhage in bullocks.
5.	*Columbo livia*	(Pigeon) '*Kabutar*'	1. Paste is prepared by mixing a 5 inch piece of root of *Pandanus odoratissimus*, 1 kg dried excreta of pigeon *Sesamum indicum* and 500 gm of jaggery. 500 gm of this paste is given once in a day for 5 days for ouster induction in cow and buffalo. 2. Bolus prepared from dried excreta of pigeon with jaggery is fed to the cattle once in a day for ouster induction
6.	*Corvus splendens*	(Crow) *'Kagla*'	One crow is hunted and boiled and fed to animal suffering from flatulence.
7.	*Gallus domesticus*	(Hen) *'Murgi*'	Shell of 4–5 eggs of hen are fed to buffalo once in a day for a week for ouster induction.
8.	*Hemidactylus flaviviridis*	(Lizard) '*Chhipkali*'	One lizard is hunted and fed to the animal suffering from lumbago and difficulty in locomotion.
9.	*Hystrix indica*	(Porcupine) '*Sehi*'	About 5 gm ash of hairs is given orally to cure asthma. Smoke treatment of burning hairs is given to the animals suffering from foot and mouth disease. Spines of hedgehog are collected and animals are exposed to the smoke of these spines to cure foot and mouth disease.
10.	Microtermes obesi holmgren	*'*Dimak*'*	Soil from termite mounds is rubbed thoroughly for 5-10 minutes on the jaw of the animal and this is repeated frequently for 3 days to treat symptoms caused by extensive feeding on immature sorghum.
11.	*Palamneaus* sp.	(Scorpion) *'Bichchhoo*'	A black scorpion is caught and is dipped in a bottle full of mustard oil. After some time the scorpion decomposes and then this oil is applied locally as an antidote to scorpion bite.
12.	*Vespa orientalis*	(wasp) *'Tatia'*	Some insects are caught and boiled with water. Steam treatment of such water is given to the mammary glands of cattle suffering from mastitis. Paste of soil of hive is applied locally to cure swelling and mastitis.

It is interesting to note that certain plants/ plant parts in small quantities are useful as ethnoveterinary medicines whereas in large quantities they are poisonous and are fatal, e.g. *Alangium salvifolium Melia azedarach, Gloriosa superba, Butea monosperma,* etc. Correct understanding of dosage of such plants may be useful in identifying their utility in ethnoveterinary medicine.

Conclusion

From the present study it was concluded that for acute, life threatening infections and epidemics, modern medicine such as antibiotics will remain the first choice. But for common and chronic conditions like skin diseases, worms, wounds, diarrhea, etc. ethnoveterinary medicines can be an alternative or complement to modern treatments especially because some antibiotics and other drugs have been overused, stimulating resistance among micro-organisms and leaving dangerous residues in meat, milk and groundwater. A combination of modern and local remedies and management practices might be the best for problems like ticks and trypanosomiasis where neither modern nor ethnoveterinary medicine alone provides a satisfactory solution.

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