TRADITIONAL VETERINARY MEDICINES FOR BUFFALO FOLLOWED BY TRIBAL FOLKS IN PALI DISTRICT OF RAJASTHAN, INDIA

Moti Lal Meena[1,*], Aishwarya Dudi[1], Dheeraj Singh[1] and Rajendra Prasad[2]

ABSTRACT

Extensive ethnoveterinary survey were undertaken during 2015-2017 to document the folk herbal practices prevalent among the different ethnic groups for the treatment of ailments of livestock in some villages of Kumbalgarh forest range district Pali of Rajasthan state. The first hand information collected by means of informal interview open ended questionnaire and crossed checked with herbs practitioners etc. 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 areas of Rajasthan in India. Ethnoveterinary surveys of the study area yielded veterinary uses of 51 plants species belonging to 49 genera of Angiosperms. Eleven buffalo based ethnoveterinary medicines are also reported. The identifies text are described by mentioning their scientific name, families, vernacular name, ethnoveterinary medicinal uses along with their mode of administration.

Keywords: *Bubalus bubalis*, buffaloes, Ethnoveterinary, ethnobotany, ethnozoology, tribal, flock knowledge, Rajasthan

INTRODUCTION

The use of plants and their parts as the source of medicine for buffalo healthcare has continued since ancient times for curing disease. This practice is still continuing in many parts of the country where veterinary services and the facilities hardly reach the beneficiaries in remote rural area and the allopathic treatment of animal is not cost effective, particularly in buffalo (Khateeb *et al.*, 2015). The ethnoveterinary practices rely on folk beliefs, traditional knowledge and skills, used for animal healthcare practices, and are transmitted from generation to generation through oral communication without any documentation (Tabuti *et al.*, 2003). Traditional animal healthcare practice, also called ethnoveterinary medicine, provide low cost alternatives in situation where western type drugs and veterinary services are

[1]Indian Council of Agricultural Research, Central Arid Zone Research Institute, Krishi Vigyan Kendra, Rajasthan, India, *E-mail: mlmeenacazri@gmail.com

[2]Central Agricultural University, Pusa, India

not available or are two 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 phytopharmaccuticals have evolved a long way with other traditional health practices and even the products are sold in country and exported.

The world buffalo population is estimated at 185.29 million, spread in some 42 countries, of which 179.75 million (97%) are in Asia (Livestock Census, 2012). India has 105.1 millions and they comprise approximately 56.7 percent of the total world buffalo population. During the last 10 years, the world buffalo population increased by approximately 1.49% annually, by 1.53% in India, 1.45% in Asia and 2.67% in the rest of the world. India ranks first in world for buffalo and has 56.7% of world's buffalo population. Total number of buffaloes in the country is 108.7 million numbers (Livestock Census, 2012). There are increasing in momentum on buffalo genetic improvement program in India particularly focused on milk production traits, institutionalizing organized evaluation and selection system, and increasing use of artificial reproductive technologies (ARTs). The buffalo contributes about 54% of the total milk produced in India and Murrah buffalo is backbone of milk industry of India.

The Aravali hills ranges, which run along the south western fringe of Rajasthan state the area under study, i.e. Kumbalgarh forest range of Desuri block is in Pali district as a part of Araveli ranges (Figure 1). The study area is situated in the western part of Rajasthan state between 24^{o}39 N latitudes, and 74^{o}45 to 75^{o}43' E longitudes, and it is one of the dense forest of Rajasthan state. The forest is mainly of Tropical Dry Mixes Deciduous type with rich floristic diversity. Rajasthan is placed at sixth place in India from the point of view of tribal population. *Bhil., Meena, Garasia, Damor, Sahriya, Gujar, Kathodia, Dindoe, Ahir, Raot, Parmar, Railka, Kanjar, Shansi etc*. are the important tribal sub-groups inhabiting the region. Tribal 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

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 (Sebastian and Bhandari, 1984; Reddy and Sudarshanam, 1987; Jain, 1991; Jain, 1999; Sikarwar *et al*., 1994). And account of botanical ethnoveterinary prescription in Rajasthan has been given by (Joshi, 1995; Singh and Pandey, 1998; Katewa and Chaudhary, 2000; Katewa and Jain, 2006). 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 tribal of Rajasthan have been mentioned.

MATERIALS AND METHODS

The study was conducted in Aravali hills ranges, which run along the south western fringe of Rajasthan state the area under study, i.e. Kumbalgarh forest range of Desuri block is in Pali district as a part of Araveli ranges (Figure 1). A survey in the tribal areas of Rajasthan was performed 10 times during different seasons from 2015 to 2017. We adopted ethnobotanical methods, anthropological methods (Alexiades and Sheldon, 1996), and participatory rural appraisal methods (PRA) (World Resource Institute, 1991; Chambers, 1994) in the field. The ethnovetrinary 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 tribal 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 years. Generally two types of interviews were taken, firstly of individuals and secondly of groups. Of individuals, persons were selected at random on the way of entering a hut. To determinate the authenticity of information collected during field works, repeated verification of data from different informants and in different times was done. Thus, only the specific and reliable information cross-checked with 15 informants have been incorporated in present study. The plants were identified at the Herbarium of Arid Forest Research Institute, Jodhpur. Information about the ethnoveterinary uses of plants are arranged 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.

RESULTS AND DISCUSSION

Tribal residing in the remote forest areas of south 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 which can lead to extinction of certain species. This means that the best result 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 70 ethnoveterinary medicinal remedies based on 51 angiosperm plant species belonging to 49 genera and 33 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 availability of certain plants, for which tribals have acquired different ways to preserve them for offseason uses. The Herbs are the primary source of medicinal plants in terms of the number of species (41.17% of total species) followed by shrubs (25.49%) and tree (23.53%) (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 a plant is, the more medicinal virtues it may possess (Coe and Anderson, 1996). The ease with which bioactive compound can be extracted are also factors that contribute to the preference of herbs. The plant parts used for medicinal preparation are bark, flowers, fruits, leaves, rhizome, roots, sap, seeds, stems, thorn and tubers. In some case whole plat is utilized. Drugs 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.

Tribal use the 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, Some 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 tricului* (eczema), *Melia azedarach* (vermifuge), *Phyllanthus fratermus* (fever) are used as medicine for same diseases in humans (Jain, 1999) 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. The ethnoveterinary study on animals reported by (Chanda *et al*., 2017; Suleyman *et al*., 2018; Khadda *et al*., 2018). 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 an alternative providing low cost alternative to imported (Rautray, 2015; Wanzala *et al*., 2005). Therefore the plants reported here may be clinically tested for their possible use in human medicine also. It is interesting to note that certain plants/plant parts in small quantities are useful as ethnoveterinary medicines whereas in large quantities they are

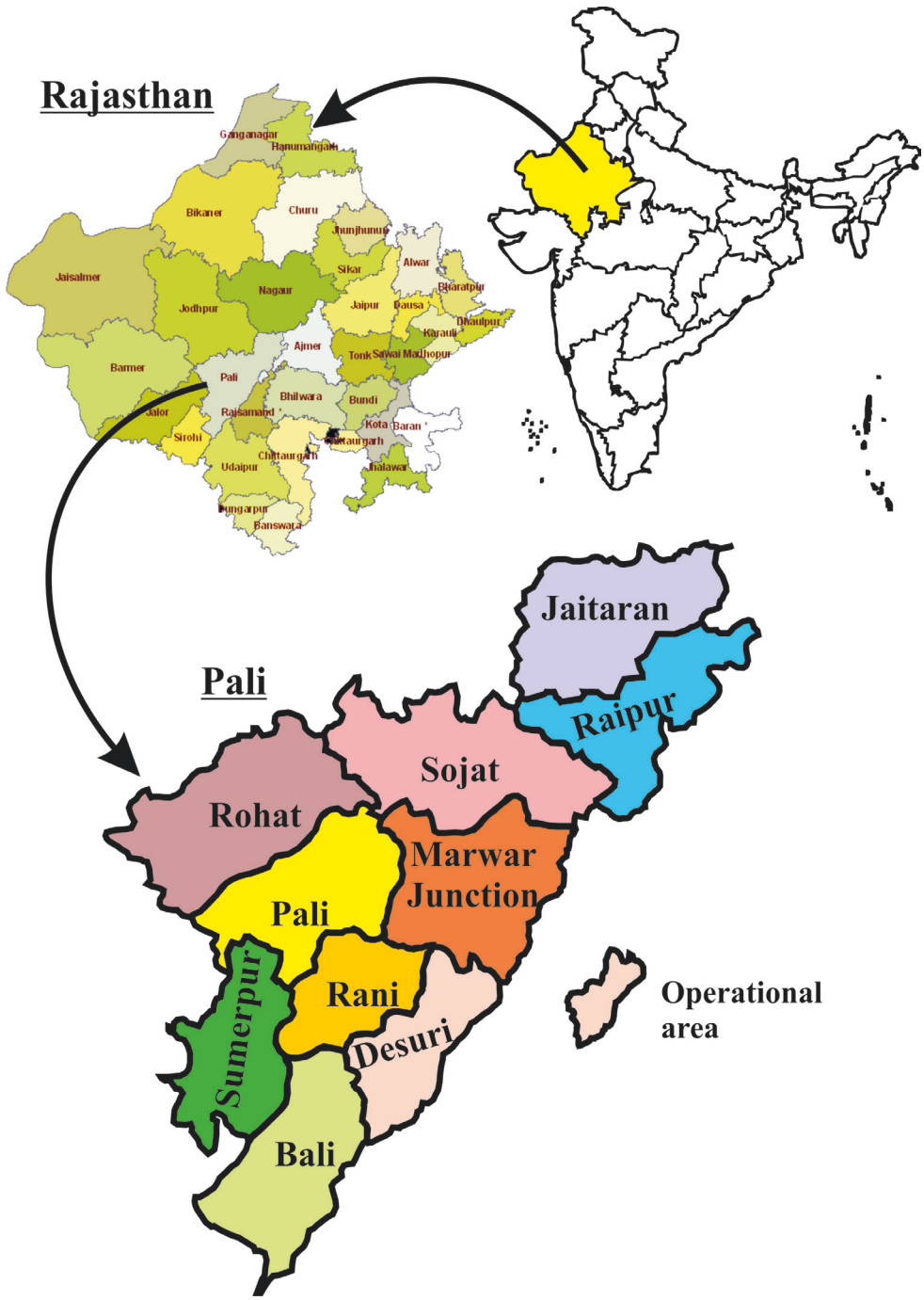

Figure 1. Location of the study.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo.

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Desmostachya bipinnata (Linn.) Staf (Poacae)	Herb	*Dab*	Whole plant	Decoction of which plant is given to buffaloes to treat flatulence.
Trigonella foemum graecum L. (Fabaceae)	Herb	*Methi*	Seeds	Half kg seed crushed of *Trgonella foenum graecum* L. is administrated 2 to 3 times a day for control of diarrhea in buffalo.
Enicostaemma axillare (Lam.) Raynal.(Gentianaceae)	Herb	*Naame*	Leaves	Leaves about 50 gm leaves are given with fodder to the young buffalo heifer for five days to treat fever.
Ephedra ciliate Fisch. (Gnetaceae)	Herb	*Oont phog*	Whole plant	Decoction of about 5 kg whole plat is given to the buffalo to cure constipation .
Euphorbia hitra Linn. (Euphorbiaceae)	Herb	*Dudhi*	Whole plant	1. Paste of about 25 gm whole plant is given with water through drenching tube once only to treat diarrhea. 2. About 10 gm leaves of Euphorbia hitra are given along with fodder once in a day for 2-3 days to cure fever in buffaloes. 3. Paste prepared from the leaves of this plant and Cynodon dactylon is given to the buffalo with milk to treat diarrhea.
Euphorbia triculli Linn. (Euphorbiaceae)	Shubs	*Danda thore*	Latex	Latex is applied locally to treat skin diseases like dermatitis, eczema etc.
Ferula asafetida Linn. (Apiccae)	Tree	*Hing*	Resin	1. Ten gm asafetida is given to the buffalo once in a day for three days to cure infection of nematodes in intestines. 2. Resin powder is given with milk to treat flatulence.
Ficus religiosa Linn. (Moraceae)	Tree	*Pipal*	Leaves	Extract of about 5 kg leaves of this plant is given orally to the buffalo to cure dysurea and haematuria.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Gloriosa superb Linn. (Liliaceae)	Climber	*Kalgari*	Tubers	Paste of about 250 gm tubers is applied over hooves of the buffalo suffering from foot and mouth diseases.
Holoptelea integrifolia (Rixb.) (Uimaccae)	Tree	*Bander bati*	Leaves	Paste of leaves of *Holoptelea integrifolia* is applied over the affected part to treat eczema.
Leucas aspera (Wild) Link (Laminaceae)	Herb	*Dargal*	Whole plant	Bolus prepared from mixture of 10 gm rhizome of *Piper longum* (*Choti piply*) and 20 gm whole plant of leaves *aspera* is given to treat fever in buffalo.
Leucas cephalotes (Roth) (Lamiaceae)	Herb	*Khumbi*	Whole plant	Whole plant is given to diseased sheep as a tonic for overall strength.
Melia azadarch Linn. (Meliaceae)	Tree	*Bakayan*	Leaves	About 25-30 gm leaves is given to the animal once in a day for 3 day removal of internal parasites. Excess quantity is poisonous.
Nicotiana tabacum (Solanaceae)	Shrub	*Tambaku*	Leaves	Mixture of 10 gm dried leaves of tobacco, 50 gm Sodium carbonate and 500 ml mustard oil is given to the animal to treat flatulence.
Ocimum americanum Linn.	Shrub	*Bapchi*	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 leucorrhoer.
Ocimum sanctum Linn. (Lamiaceae)	Shrubs	*Tulsi*	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 milch buffalo.
Pedalium murex Linn. (Pedaliaceae)	Herb	*Dakhani gokhur*	Whole plant	Whole plant is fed to the animal for its cooling effect during summers.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Plumbago zeylanica Linn. (Phumlbaginaceae)	Shrub	*Chitrak*	Seeds	Seeds decoction of about 250 gm seeds of *Trachyspermum ammi* and 2-4 leaves of *Phumbago zeylanica* is given to the buffaloonce only to treat flatulence.
Rhus mysurensis G. Don. (Anacadiaceae)	shrub	*Dansarae*	Leaves	Leaf paste is applied over the body against allergy/rashes/ eczema
Sida ovate Fork (Malvaceae)	Herb	*Khariti*	Whole plant	Whole plant is given with fodder to the animal followed by hard work as a pain reliever.
Soymida febrifuga (Roxb.) Mediaceae)	Tree	*Rohin*	Bark	Bark of *Butea monosperma* and *Soymida febrifuga* (100 gm each) is crushed with 500ml of buttermilk. This does is given to the animal suffering from diarrohea thrice a day till the buffalo recuperates.
Spermacoce stricta L. (Rubiaceae)	Herb	*Agio*	Whole plant	Decoction of the plant is given to the buffalo to cure vulvo-vaginal uterine prolapsed.
Tecomella undulate (Sm.) Seem (Bignoniaceae)	Tree	*Baheda*	Fruits	Pulp of about 750 gm fresh fruit or about 500 gm of dried fruit powder is given orally twice a day for at least 7 days for relief from diarrhea.
Terminalia chebula Retz. (Combretaceae)	Tree	*Harad*	Fruit	About 50 gm hard, 50 gm rock salt, 50 gm seeds of *Traychyspermum ammi*, 25 gm *neero*, 25 gm *Elytaria* (*Chhoti ilayechi*), 50 gm Sodium bicarbonate and 500 gm jaggary are mixed and bolus of 150 gm 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*	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 olepsi*	Leaves	Influsion of 100 gm dried leaves is given orally to treat diarrhea.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Abutilon indicum (Linn.) (Malvaceae)	Shrub	*Kanghi*	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 buffalo along with fodder to cure haematuria.
Acacia nilotica (Linn.) (Mimosacae)	Tree	*Babool*	Thorn	Decoction of old thrones (2 to 3 year) is given to the animal for easy removal of placenta after delivery.
Achyranthes aspera Linn. (*Amaranthaceae*)	Herb	*Modo kanto*	Rhizomes and Whole plant	1. Decoction of the whole plant is given to fuffalo once for easy removal of plants after delivery 2. Leaf juice is used as eye drops for curing opacity of cornea
Aeva lantana (Linn.) Juss	Herb	*Chhoti bui*	Roots	Roots (100 gm are crushed and given orally as an antidote in snake bite.
Aerva persica (Burm f.)	Herb	*Safed bui*	Flower, roots, whole plant and inflorescence	1. Decoction of flowers (500 ml 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 buffalo 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*	Roots and leaves	1. Roots (50 gm) are ground with 500 ml of buttermilk and given to be buffalo 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 buffalo with water to cure malaria fever as well as to treat enlargement of liver.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Allium sativum Linn. (Liliaceae)	Herb	*Lahsan*	Bulbs	Paste of prepared by mixing crushed bulb with two eggs of hen and 1.5 liter of milk and given to the buffalo to treat impaction and lumbago.
Anisomeles indica (L.) O. (Limiaceae	Herb	*Ghbro*	Whole plant	Decoction of the whole plant (200 gm) is given to buffalo to treat flatulence as well as leucorrhoea.
Anogeeissus latifoli (Roxb.) (Combretaceae)	Tree	*Dhawada*	Bark	Bark decoction of handful of bark is given to the animal twice a day for 2 days to treat fever of buffalo
Aristolochia indica Linn. (Aristolochiaceae)	Shrub	*Gorisal*	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 buffalo.
Azadirachta indica A. Juss (Meliaceae)	Tree	*Neem*	Leaves	Leaves of *Azadirchata indica* are given as fodder to the buffalo to treat leucorrhoea.
Boswellia serrata Roxb. (Burseraceae) tree	Tree	*Salar*	Bark	Decoction of bark is given to the animal in arthritis and also in indigestion, windiness and flatulence.
Calligonum polygonoides Linn. (Polygonaceae)	Shrub	*Phog*	Whole plant	Extract of whole plant is given to treat constipation. Decoction of whole plant is given to treat urinary problem.
Calotropis procera (Ait) R. Br. (Asclepiadaceae)	Shrub	*Akra*	Latex	Mixture of 50 ml Hydrochloric acid, 50 ml latex of *Calotropix procera* and 50 ml latex *of Mangifera indica* is used as an antidote to scorpion bite
Capparis deciduas (Forsk) (Capparaceae)	Shrub	*Ker*	Stem	Syrup is made by mixing of ½ kg shoots of *Cissus quadrangular*, ½ kg ash of stem of *Capparris deciduas* and roots of *Ziziphus jujube*, ½ kg Jaggery and milk. This is given to the cattle once in a day, daily for early healthing of fractured bone.
Cactunaregam spinosa (Thunb.) Tiruv. (Rubiaceae)	Shrub	*Kharedi*	Whole plant	About 500 gm of whole plant, 50 gm of jaggary and 25 gm of dried rhizome as a fodder to treat diarrhea.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Celosia argentea Linn. (Amaranthaceae)	Herb	*Garkha*	Roots	Root juice of *Celosia argentea* (100 ml) mixed with extract of fruits or leaves of *Tamarindus indica* is given orally to treat food-poisoning.
Citrullus colocynthis L. (Cucurbitaceae)	Climber	*God tumba*	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, 20 gm mustard oil is applied internally for easy opening of uterus during delivery.
Cocculus pendulus (Forst.) Diels (Menispremaceae)	Climber	*Pilwan*	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*	fruits	Juice of 10 lemons is given with 750 gm sugar to induce lactation.
Cleome gynadra Linn. (Cleomaceae)	Herb	*Safed hulhul*	Leaves	Paste of leaves of *Cleome gynandra* is applied locally twice a day to treat eczema.
Cleome viscose Linn. (Cleomaceae)	Herb	*Hulhul*	Seeds	Paste of about 50 gm seeds of Cleome viscose is given with water through drenching tube, thrice a day for relief in diarrhea and fever.
Corallocurpus epigaeus (Rottl.)	Climber	*Mirchiakand*	Tuber	About 250 gm of paste preparation from one tuber of *Corallocarpus epigaeus* and whole plant of *Tinospora cardifolia* 3 days to treat tonsillitis.
Cardia dichotoma Forst. F. (Ehretiaceae)	Shrub	*Goonda*	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.

Table 1. List of ethnoveterinary plants used in various ailments of buffalo. (Continue)

Name of plant species	Habit	Local name	Plant part used	Mode of administration
Crotalaria indica Buch (Fabaceae)	Herb	*Jhiunda*	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	*Amae bel*	Whole plant	One kg whole plant of *Cuscuta reflexa*, 1 kg leaves of *Datura innoxia* are boiled in one liter of mustard oil. Massage of this oil is given to the buffalo to get relief from lumbago and rheumatic pain.

Table 2. Medicinal plants arranged by the growth forms.

Life form	Total species	Percentage
Herbs	21	41.17%
Shrubs	13	25.49%
Tree	12	23.53%
Climbers	05	09.80%
Total	**51**	**100%**

poisonous and are fatal e.g. *Alangiuna salvifolium Melia azedarach, Gloriosa superb*, *Butea monosperma* etc. Correct understanding of dosage of such plants may be useful in identifying their utility in ethnoveterinary medicine. The findings confirm with the findings of (Tariq *et al*., 2014; Dudi and Meena, 2015; Gupta *et al*., 2015; Khateeb *et al*., 2015; Rautray *et al*., 2015).

CONCLUSION

From the present study it was concluded that sixty three indigenous technical knowledge practices were identified and documented. A total of fifty one species of plants and ingredients used for treatment of different ailments were documented. The traditionally healers and pastoralist of Pali district tribes depend on ethnoveterinary practices in order to treat their buffalo due to the unavailability of modern veterinary healthcare practices to be available in the tribal area of Rajasthan. For acute, life threatening infections and epidemics, modern medicine such as antibiotics will remain the modern medicine such as antibiotics will remain the first choice. But for common and chronic conditions like skin diseases, 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. An important observation of this study was that the traditional healers complained about the slow disappearance of rare plants in the region as instated of collecting the only required portion of a medicinal plant, the whole plant was being uprooted by some healers. 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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