

Insights into ethnoveterinary practices used by various communities in Dhemaji district of Assam

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A study was carried out for documentation of ethnoveterinary practices prevalent among the various communities of the Dhemaji district of Assam. Personnel interviews, questionnaires, participatory rural appraisal, group discussions, and field visits were followed to collect the data. A total of 250 livestock farmers were selected across the district from 25 villages. The degree of adoption and effectiveness of each ethnoveterinary practice were expressed in percentage considering the responses of sampled farmers. A total of 62 ethnoveterinary practices were recorded where 43 plant species of 30 families were used to treat 33 common ailments in livestock and poultry. The highest, 28 practices were used for treatments of cattle followed by 21 for treatments of pigs, 8 for poultry, and 5 for Goat against the common issues related to the digestive system, fever, parasitic infestation, viral infection, bone fracture, retention of placenta (ROP), weakness and other health condition in livestock and poultry where the adoption was ranged from 6.00 to 89.33 percent. The present documentation will help the researchers, environmentalists, and other stakeholders towards better understanding in traditional knowledge, distribution of valuable resources and biodiversity conservation of the district.

Keywords: Ailments, Ethnoveterinary, Indigenous, ITK, Livestock, Treatment

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Indigenous Technological Knowledge (ITK) is the knowledge that is rooted in our origins, passed down through generations and applied to every aspect of daily life¹. This indigenous knowledge has been used effectively since the very beginning of the quest for livelihood. In agriculture, much of this knowledge is applied by farmers, whether they know it is scientific or not. However, this is the knowledge of indigenous peoples living in different geographical locations around the world, based on their social beliefs, culture, tradition, folklore, rituals and language. They have evolved out of the need to preserve the immediate environment while maintaining sustainability and are the result of close interaction with nature and available natural resources.

Various ITKs have also been used in livestock farming since the early days of animal husbandry to treat diseases, nutritional disorders, husbandry management, breed or variety selection, etc. Farmers, livestock keepers and other professionals have gained and utilized some knowledge through cumulative

experiences for animal welfare, especially for the treatment of diseases, wounds and parasite infestations, using indigenous herbs, shrubs and plants, known as ethno-therapeutic practices. Traditional animal health care is the focus of ethnoveterinary medicine, which includes all the information, expertise, techniques, customs, and beliefs related to animal health care². For primary healthcare resource-poor farmers worldwide are forced to depend on traditional remedies due to the lack of sufficient modern medicines³ and veterinary health care system^{4,5}. The traditional ethno-veterinary remedies have been playing a significant role in building the rural economy because livestock rearing is an indispensable agricultural activity among the rural masses of the country, but has become extinct or endangered due to rapid changes in the socioeconomic, environmental, and technological landscape. The North-eastern states of India is endowed with a variety of favourable physiographic and ecoclimatic conditions and serve as the “biodiversity hotspots” for a large portion of the country's indigenous flora and fauna⁶. The agrarian district Dhemaji of Assam is inhabitant of indigenous communities of all hues such as like

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Misings, Boro, Sonowal Kachari, Deori, Lalung, Hajong, Ahoms, Kalitas and Konch, with diversified social motifs and beliefs which is noticeable in agriculture and allied sector. Livestock and poultry rearing are considered important ways of livelihood for the rural tribal masses of the district which is dominated by lots of traditional knowledge and practices. Moreover, as forest dwellers, the rural people have vast knowledge of plants which they have been using for healing various diseases of both men and animals. Proper documentation of this knowledge is the need of the hour in the context of natural farming and for reference in future studies. In light of these considerations, the present study was conducted to document ITKs on ethnoveterinary practices prevalent among the various communities of Dhemaji district in Assam. The findings will serve as a proper document for validation and refinement in due course of time.

Materials and Methods

Study area

Agro climatically Dhemaji district falls under the North Bank Plain Zone (NBPZ) of Assam and is located between 94°12'18"E and 95°41'32"E longitude and 27°05'27"N and 27°57'16"N latitude. Administratively the district is divided into five (5) development blocks namely, Dhemaji, Bordoloni, Machkhowa, Sissiborgaon and Jonai (MSTD). For the present study, 25 numbers of villages were selected across the district, five from each administrative block so that represented all the communities. The list of selected villages is presented in Table 1 with their location on the district's map in Figure 1. From each village, ten (10) numbers of respondents were selected based on a discussion with the village head and focussed farmer and their traditional involvement in various livestock rearing.

Survey method

For the collection of data survey with a pre-structured schedule was conducted using extension methods such as participatory rural appraisal (PRA), group discussion, discussion with village head

(*gaonburha*), practicing farmers, community leaders, and finally interviews with selected farmers through personal contact. The group discussion and interactions were conducted during organizing training and other extension programmes by KVK Dhemaji at said locations. Thus, a total of 250 livestock farmers participated directly from selected 25 villages and the sample size were justified as the same practices are followed within the communities. An interview schedule was prepared to gather the required information in detail and the same was responded by selected farmers. During the survey time, prior informed consent (PIC) was taken from the respondent, particularly community leader for publication of this traditional wisdom.

Data tabulation and analysis

Finally, a list of the indigenous practises was prepared along with name of plant species used, and method of preparation and administration. Then identified 250 farmers were asked individually on listed indigenous technology whether he or she has been using in treating the ailments of their livestock and poultry which gave result on the degree of adoption of each indigenous practise, expressed in percentage. Individual ethnoveterinary practice was ranked as 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th and 9th using range *viz.*, above 80.0%; 70.0 to 79.9%; 60.0 to 69.9%; 50.0 to 59.9%; 40.0 to 49.9%; 30.0 to 39.9%; 20.0 to 29.9%; 10.0 to 19.9% and below 10.0%, respectively based on the data obtained on adoption percentage. To study the effectiveness of each practices data were collected through questionnaires indicating option as mostly, frequently and occasionally by respondents who has adopted particular practice.

Results

There were 43 numbers of plants species of 30 families recorded which were used in ethnoveterinary practices (Table 2) where, 4 plant species have been identified from each family of *Poaceae* and *Rubiaceae*, 3 plant species were identified under the family *Lamiaceae*. Similarly, under the families, *Asteraceae* and *Moraceae*, 2 plant species each were

Table 1 — The list of villages along with development block for data collection

Sl no	Block	Villages
1	Dhemaji	Tekjuri, Kuwafala, Matikhula, Kamargaon, Jamukani
2	Sissiborgaon	Mothdang, Nilakhtarani pathar, Aatkainahoroni, Salakhani, Phulbari,
3	Jonai	Purna Jelam, Handiquegaon, Jorhotiagaon, Notun Jelam, Leku
4	Bordoloni	Borbambhebeli, Bhebelisonowal, Kasutoli, Bhuma, Joyrampur
5	Machkhowa	Bengenagora Nahoroni, Borpakbhareki, Deughoria, Jorkata, Kaitong

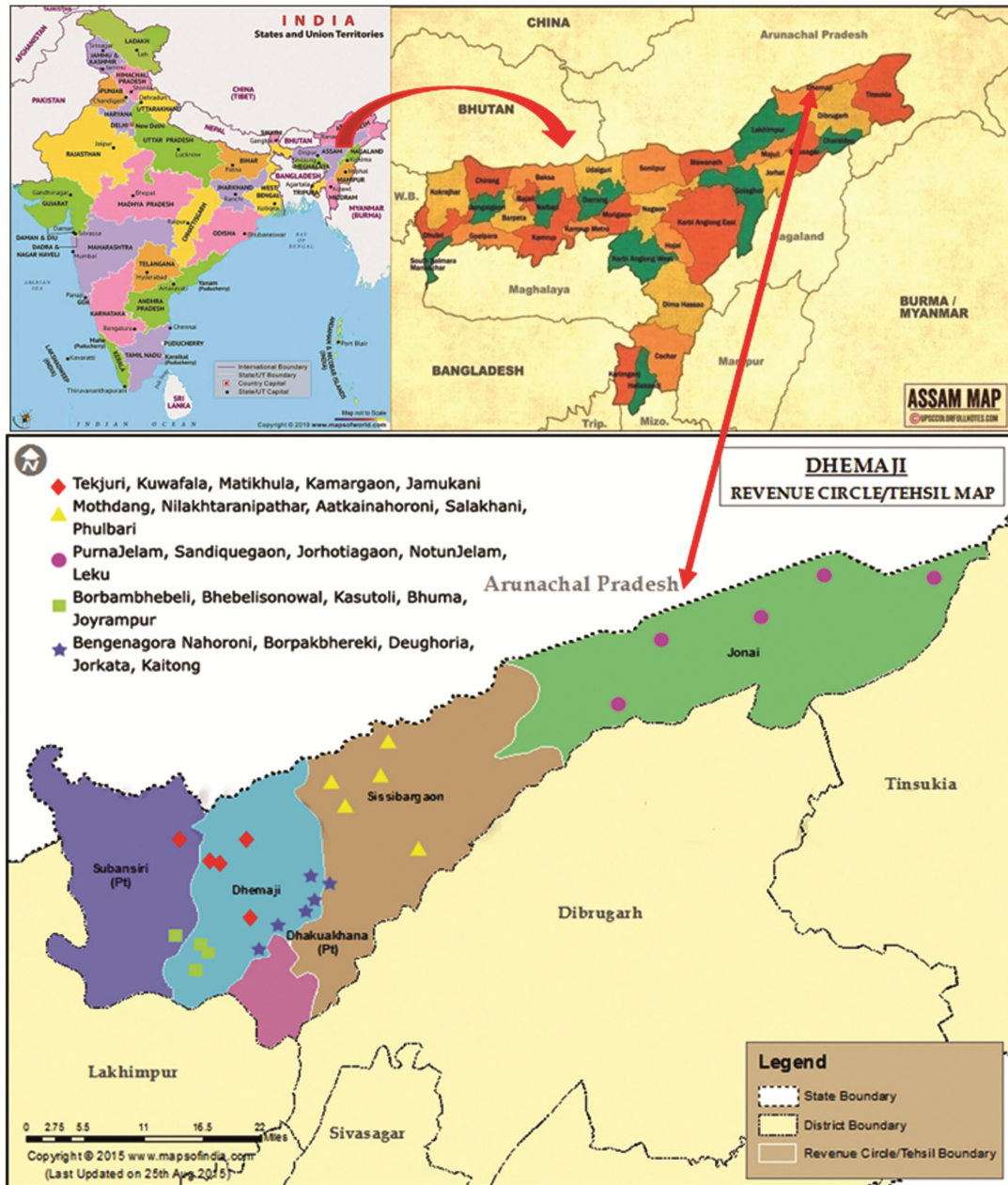


Fig. 1 — Map of Dhemaji district and location symbol indicating survey villages
(Source: <https://www.mapsofindia.com/maps/assam/tehsil/dhemaji.html>)

identified and single plant species from other 25 families were found to be utilized for ethnoveterinary practices (Table 2).

During the survey, a total of 62 ethnoveterinary practices were recorded that were being used for the treatment of 33 common ailments in livestock and poultry. Out of total recorded practices, 28 were being practised to treat 21 ailments in cattle followed by 21 which were practiced to treat 13 ailments in pig, 8 were practiced to treat 6 ailments in poultry (chicken

and duck) and 5 to treat 5 common ailments in goat (Table 3). On the other hand, 23 practices were recorded for treatment of issues relating to the digestive system, 9 were practised for treatment of fever, 9 were practised for control of parasitic infestation, 4 practises each for viral infection, bone fracture and wound including skin infection, 3 practices for ROP and 2 practices for weakness condition and 4 practises were identified for treatment of other illnesses in livestock and poultry (Table 3).

Table 2 — List of plants with common name, scientific name, their families and habited recorded for treating different ailments in livestock and poultry

Sl. No.	Common name	Scientific name	Family	Growth Habit
1	Garlic	<i>Allium sativum</i> L.	Amaryllidaceae	Bulbous
2	Amla / Indian Gooseberry	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Tree
3	Ginger	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Rhizomatous
4	Turmeric	<i>Curcuma longa</i> L.	Zingiberaceae	Rhizomatous
5	Lawn marsh pennywort	<i>Hydrocotyle sibthorpioides</i> Lam.	Araliaceae	Perennial herb
6	Climbing cactus, /stemmed vine	<i>Cissus quadrangularis</i> L.	Vitaceae	Succulent, climbing shrub
7	Arjun tree	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn	Combretaceae	Tree
8	Holy Basil	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Annual herb
9	Betelvine	<i>Piper betle</i> L.	Piperaceae	Climber
10	Neem	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Tree
11	East Indian Glory Bower	<i>Clerodendrum colebrookianum</i> Lindl.	Lamiaceae	Shrub
12	Thumbai	<i>Leucas aspera</i> (Wild.) Link	Lamiaceae	Annual herb
13	Indian squill/sea onion	<i>Drimia indica</i> (Roxb.) Jessop	Asparagaceae	Bulbous
14	Guava	<i>Psidium guajava</i> L.	Myrtaceae	Tree
15	Creeping wood sorrel	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb
16	Wood apple	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Tree
17	Goethe plant	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Crassulaceae	Succulent herb
18	Bamboo	<i>Bambusa balcooa</i> Roxb.	Poaceae	Perennial grass
19	Tobacco	<i>Nicotiana tabacum</i> L.	Solanaceae	Perennial herb
20	Parasitic maiden fern	<i>Cyclosorus parasiticus</i> (L.)	Thelypteridaceae	Herb
21	Bamboo	<i>Bambusa vulgaris</i> Schrad. Ex J. C. Wendl.	Poaceae	Perennial grass
22	Siamese rough bush	<i>Streblus asper</i> Lour.	Moraceae	Tree
23	Henna	<i>Lawsonia inermis</i> L.	Lythraceae	Shrub
24	Lovegrass or Canegrass	<i>Eragrostis lingulate</i> (L.) Wolf/ <i>E. perbella</i>	Poaceae	Perennial grass
25	Jackfruit	<i>Artocarpus heterophyllus</i> L.	Moraceae	Tree
26	Diamond flower plant	<i>Oldenlandia corymbosa</i> L.	Rubiaceae	Annual herb
27	Tropical Chickweed	<i>Drymaria cordata</i> (L.) Willd. Ex Schult.	Caryophyllaceae	Annual herb
28	Asiatic pennywort	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Annual herb
29	Stinkvine	<i>Paederia foetida</i> L.	Rubiaceae	Perennial Vine
30	False daisy	<i>Eclipta prostrata</i> L.	Asteraceae	Annual herbaceous plant
31	Chameleon plant/Heartleaf	<i>Houttuynia cordata</i> Thunb	Saururaceae	Perennial herb
32	Devil's tree/ Scholar tree	<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	Tree
33	Cowa Mangosteen	<i>Garcinia cowa</i> (Gaertn.) Desr.	Clusiaceae	Tree
34	Indian hemp/ marijuana	<i>Cannabis sativa</i> L.	Cannabaceae	Annual herb
35	American Rope/ bitter vine/climbing hemp vine	<i>Mikania micrantha</i> Kunth	Asteraceae	Perennial Climber
36	Spiny lasia	<i>Lasia spinosa</i> (L.) Thwaites	Araceae	Herbaceous perennial shrub
37	Assam lemon	<i>Citrus limon</i> L.	Rutaceae	Perennial Shrub
38	Stalked Persian Violet	<i>Exacum pedunculatum</i> L.	Gentianaceae	Perennial shrub
39	Drum stick	<i>Moringa oleifera</i> Lam.	Moringaceae	Tree
40	Roselle	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Annual shrub
41	Touch me not	<i>Mimosa pudica</i> L.	Fabaceae	Perennial shrub
42	Bird's eye chilli	<i>Capsicum annum</i> L.	Solanaceae	Shrub
43	Indian goosegrass	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Annual grass

In most of the ethnoveterinary practices (57) single plant species was used whereas only in 5 practices combination of 2 to 3 plant species were used. The data on adoption of ethnoveterinary practices ranged from 6.0% to 89.3%. *Lasia spinosa* used for treating dysentery in pig showed the highest (89.3%) adoption and remarked as mostly effective by the respondents followed by *Mikania micrantha* (86.0%) which was also used for treatment of dysentery in pig, and *Curcuma longa* (86.0%) for treating joint pain and

bone fracture in cattle, *Cissus quadrangularis* (82.7%) for treating bone fracture in cattle and *Citrus limon* (80.7%) for treating dysentery in pigs were found to be the most effective and ranked 1st as per the responses obtained. Other ethnoveterinary practices ranked 2nd by adoption were *Azadirachta indica* (79.3%) which is used to treat skin diseases in cattle, *C. longa* (79.33%) to treat FMD in cattle, combination of *Houttuynia cordata*, *Alstonia scholaris*, *Phyllanthus emblica* (79.33%) to treat fever with diarrhoea in pig, *Allium*

sativum (76.0%) to treat indigestion in cattle, *Psidium guajava* (74.0%) to treat diarrhoea in pig, *Hydrocotyle sibthorpioides* (72.7%) to treat indigestion and GI tract ulcer in cattle, *Nicotiana tabacum* (72.7%) to treat tick and lice infestation and combination of

H. sibthorpioides, *Paederia foetida* and *Leucas aspera* (72.7%) to treat fever in pigs. On the other hand, the use of leaves of *Bambusa balcooa* for treatment of HS in cattle and worm infestation in calf was the lowest adoption (6.0%) among the recorded practices.

Table 3 — List of ethnoveterinary practices recorded in different animal species, ailments, plants, plant parts used, method of preparation, mode of use and their adoption (%), rank and effectiveness

Sl. No.	Ailments	Name of the plants used		Method of preparation, plants parts used and mode of administration	Adoption * %	Rank	Effectiveness
		Local name	Common name				
A. Species: Cattle							
1.	Indigestion	Naharu	Garlic	1-2 hand full of crushed bulb according to the weight of the animal is given orally	76.00 (114)	2 nd	Mostly
2.	Indigestion	Aamlakhi	Amla/ Indian Gooseberry	Juice extract by stuffing 15-20 numbers of Amla is given orally along with salt.	59.33 (89)	4 th	Mostly
3.	Indigestion	Ada, Halodhi	Ginger, Turmeric	Administered equal amount of crushed bulb of Ginger and turmeric orally considering age of cattle	52.67 (79)	4 th	Frequently
4.	Indigestion, GI tract ulcer	Manimuni	Lawn Marsh pennywort	50-100 g of crushed plant is given orally	72.67 (109)	2 nd	Mostly
5.	Joint ill, pain, bone fracture	Halodhi	Turmeric	Paste is made and applied in the affected area	86.00 (129)	1 st	Mostly
6.	Bone fracture	Harjura lota	Climbing cactus/ stemmed vine	Leaves are crushed and the applied on the affected area by rapping with stem of same plant or other thread	82.67 (124)	1 st	Mostly
7.	Bone fracture	Arjun gos	Arjun tree	Bark of the tree is crushed and make a fine paste applies on the affected area	32.67 (49)	6 th	Frequently
8.	Cough and fever	Tulashi	Holy basil	Juice extracted from 50/60 leaves is given orally	59.33 (89)	4 th	Frequently
9.	Dystocia	Paan	Betel vine	Crushed 10/12 leaves are fed to the animal	19.33 (29)	8 th	Occasionally
10.	Skin diseases	Neem	Neem	Boil the leaves and the water is applied in the body	79.33 (119)	2 nd	Mostly
11.	Restlessness	Nefafu	Pakkom, East Indian Glory Bower	Crushed leaves are fed to the animal	12.67 (19)	8 th	Frequently
12.	Respiratory tract infection,	Dorun bon	Thumbai	Juice extracted from leaves and tips is given orally	29.33 (44)	7 th	Frequently
13.	Bloat	Bonpiyaj	Indian squill/ sea onion	4/5 plants roasted in fire by rolling green banana leaf and administered by mixing with little amount of salt	46.00 (69)	5 th	Occasionally
14.	Diarrhoea	Madhuri	Guava	Crushed tender leaves (10/12 numbers) is given orally	52.67 (79)	4 th	Mostly
15.	Dysentery	Tengesi	Creeping wood sorrel	Crushed leaves are fed.	32.67 (49)	6 th	Frequently
16.	Dysentery	Bael	Wood apple	About 250-500 g of ripe fruit according to the size of animal is given orally for two to three days	28.00 (42)	7 th	Occasionally
17.	Wound	Duportenga	Goethe plant	Crushed leaves and make a fine paste is tied on the wound to stop bleeding.	19.33 (29)	8 th	Occasionally

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Table 3 — List of ethnoveterinary practices recorded in different animal species, ailments, plants, plant parts used, method of preparation, mode of use and their adoption (%), rank and effectiveness (Contd.)

Sl. No.	Ailments	Name of the plants used		Method of preparation, plants parts used and mode of administration	Adoption * %	Rank	Effectiveness
		Local name	Common name				
A. Species: Cattle							
18.	Worms on wound area	Naharu	Garlic	Paste of crushed leaves applied on the affected area.	26.00 (39)	7 th	Mostly
19.	Worm infestation (Calf)	Bhaluka bah	Bamboo	20/25 leaves are fed to the calves for deworming	6.00 (9)	9 th	Frequently
20.	Ticks and lice	Dhopat	Tobacco	50/60 g leaves are boiled in 10/12 liters of lean water and poured over body when getting cold	72.67 (109)	2 nd	Mostly
21.	Ticks and lice	Bihlongani	Parasitic maiden fern	Floor of the shed of affected animal is covered with the leaves and animal is allowed to rest	52.67 (79)	4 th	Mostly
22.	HS	Bhaluka bah	Bamboo	Leaves are fed to the affected animal	6.00 (9)	9 th	Occasionally
23.	FMD	Halodhi	Turmeric	First burn the blisters or vesicles with hot needle or such appliances, then turmeric paste is applied in the affected area.	79.33 (119)	2 nd	Mostly
24.	Retention of placenta (ROP)	Mokal bah	Bamboo	Two hand full of crushed leaves are fed to the cow to expel the placenta	39.33 (59)	6 th	Frequently
25.	ROP	Saura	Siamese rough bush	About 80 - 100 g of leaves are crushed and administered orally just after parturition	20.67 (31)	7 th	Frequently
26.	LSD	Tulashi	Indian basil	25/30 bay leaves boiled in 15/20 liters of water and allowed to cool, added crushed leaves of tulsi and applied on skin	28.67 (43)	7 th	Frequently
27.	LSD	Neem, Jetuka, Halodhi	Neem, Henna, Turmeric	Equal amount of three ingredients are crushed and applied on the affected area followed by applying coconut oil	26.67 (40)	7 th	Occasionally
28.	Anorexia/off fed	Mouerali	Canegrass/ Lovegrass	15/20 plants roasted in fire by rolling green banana leaf and administered by mixing with little amount of salt	16.67 (25)	8 th	Occasionally
B. Species: Goat							
29.	Cataract	Manimuni, Bon jaluk	Lawn Marsh pennywort, Diamond flower plant	Juice is given to the affected eye	16.00 (24)	8 th	Frequently
30.	ROP	Bhaluka bah	Bamboo	Fed the leaves as normal feed	52.67 (79)	4 th	Frequently
31.	Bloat	Lai jabori	Tropical Chickweed	Leaves (100-150 g) are crushed and fed	14.00 (21)	8 th	Occasionally
32.	Worm problem	Neem	Neem	Feed <i>ad lib</i> leaves as normal feed	73.33 (110)	2 nd	Mostly
33.	Diarrhoea	Kathal	Jackfruit	Feed <i>ad lib</i> the leaves along with other normal feed	53.33 (80)	4 th	Mostly
C. Species: Pig							
34.	Weakness, low growth	Manimuni	Lawn Marsh pennywort	Juice (aapox. 100 mL) of both the plant's leaves are mixed with honey and given orally	69.33 (104)	3 rd	Mostly
35.	Fever	Bormanimuni	Asiatic pennywort	Leaves are crushed with piper nigrum L. and given orally.	87.33 (131)	1 st	Mostly

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Table 3 — List of ethnoveterinary practices recorded in different animal species, ailments, plants, plant parts used, method of preparation, mode of use and their adoption (%), rank and effectiveness (Contd.)

Sl. No.	Ailments	Name of the plants used		Method of preparation, plants parts used and mode of administration	Adoption * %	Rank	Effectiveness
		Local name	Common name				
C. Species: Pig							
36.	Fever	Manimuni, Bhedailata, Dorun bon	Lawn Marsh Pennywort, Stinkvine, Thumbai	Leaves of all the plants are crushed and fed to the affected animal and juice is also given orally	72.67 (109)	2 nd	Mostly
37.	Fever and cough	Kehraj, Bon jaluk	False daisy	Juice of leaves is given orally	32.67 (49)	6 th	Frequently
38.	Fever with Diarrhoea	Masundari, Satiyna, Aamlakhi	Heartleaf, Devil's tree, Amla	Juice made by mixing of all the ingredients equally is given orally	79.33 (119)	2 nd	Mostly
39.	Diarrhoea	Kujithekera	Cowa Mangosteen	Crushed fruit is given orally	36.00 (54)	6 th	Frequently
40.	Diarrhoea	Madhuri	Guava	20/12 tender leaves and tips crushed and given orally	74.00 (111)	2 nd	Mostly
41.	Diarrhoea in Piglet	Bhang	Indian hemp/ marijuana	Juice of fresh leaves (20/25 numbers) or powder of dried leaves (10-20 g) is given orally	66.00 (99)	3 rd	Mostly
42.	Diarrhoea in Piglet	Premlota/ Japani lota	American Rope/ Chinese Creeper	Juice of leaves (30/40 g) is given orally	46.00 (69)	5 th	Occasionally
43.	Dysentery	Sengmora	Spiny Lesia	The plants are crushed and fed by mixing with feed	89.33 (134)	1 st	Mostly
44.	Dysentery	Premlota/ Japani lota	American rope/ Chinese creeper	Leaves are feed <i>ad lib</i> to the animal as such	86.00 (129)	1 st	Mostly
45.	Dysentery	Kaji nemu	Assam lemon	Juices of 2/3 fruit given orally.	80.67 (121)	1 st	Mostly
46.	Bloat	Premlota/ Japani lota	American rope/ Chinese creeper	Juice of 100-150 g leaves is given orally	46.00 (69)	5 th	Occasionally
47.	Worm problem	Sengmora	Spiny lesia	Crushed stem (5/6 numbers) and tender leaves is given orally	29.33 (44)	7 th	Occasionally
48.	Worm problem	Sirota	Stalked Persian Violet	Juice extracted by crushing tender stem and leaves is given orally	52.67 (79)	4 th	Frequently
49.	Low milk production (Post-partum Calcium deficiency)	Sazina	Drum stick	Leaves are fed <i>ad lib</i> to the animal directly	32.67 (49)	6 th	Mostly
50.	Constipation and fever	<i>Tengamora</i>	<i>Roselle</i>	Boil about 250 g of leaves and fruit with water and decoction is given orally for 3-4 days	29.33 (44)	7 th	Frequently
51.	Inappetence	Bhang	Indian hemp/ marijuana	Chopped leave of both raw and dried are combined with pig feed.	54.67 (82)	4 th	Mostly
52.	Maggoted wound	Dhopat	Tobacco	It is applied to the wound for 3-4 days using a paste made from grounded dried leaves of Dhopat and dissolved lime.	52.00 (78)	4 th	Mostly
53.	Skin infection	Tulashi	Indian basil	About 50 g of leaves and stem is crushed into paste and applied to the infected area	68.00 (102)	3 rd	Mostly
54.	Viral infection	Aamlakhi, Kaji nemu	Amla, Assam lemon	Juice of amla (10-15 numbers) or juice of lemon (2/3 numbers) fed by mixing with feed or water fed regularly	50.00 (75)	4 th	Frequently
D. Animal species: Poultry (Chicken, Duck)							
55.	Diarrhoea	Dorun bon	Thumbai	Juice of the crushed leaves is mixed lemon juice and given orally.	36.00 (54)	6 th	Frequently

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Table 3 — List of ethnoveterinary practices recorded in different animal species, ailments, plants, plant parts used, method of preparation, mode of use and their adoption (%), rank and effectiveness (Contd.)

Sl. No.	Ailments	Name of the plants used		Method of preparation, plants parts used and mode of administration	Adoption * %	Rank	Effectiveness
		Local name	Common name				
D. Animal species: Poultry (Chicken, Duck)							
56.	Fever	Nelaji bon	Touch me not	Roots is crushed and given orally.	19.33 (29)	8 th	Occasionally
57.	Fever	Kon jalakia	Bird's eye chilli	10/12 fruits crushed with 100 g turmeric and given as food.	54.00 (81)	4 th	Frequently
58.	Fever	Bormanimuni	Asiatic pennywort	Juice extracted by crushing leaves are given orally	67.33 (101)	3 rd	Mostly
59.	Lethargy	Bihlongani	Parasitic maiden fern	The leaves are placed on the ground and allowed to rest.	50.67 (76)	4 th	Frequently
60.	Ranikhet	Aamlakhi	Amla	Juice of Amla (30 nos/100 birds with 100 mL water) is given in early stage of this disease	31.33 (47)	6 th	Occasionally
61.	Duck Cholera	Bihlongani	Parasitic maiden fern	Floor of the shed of affected duck is covered with the leaves and birds are allowed to rest	23.33 (35)	7 th	Occasionally
62.	Fractured bone	Bobosa bon	Indian goosegrass	Smashed the whole plant and applied	22.67 (34)	7 th	Occasionally

*Data within parenthesis are number of respondents who have adopted

It was also observed that same plant species is used for treatment of different ailment in different animal species either as single or in combination of 2 or 3 species. *P. emblica* found to be used for treatment of ailments viz., indigestion in cattle, and Ranikhet in poultry, while combined with *C. limon* is used for treating viral infection in pig, and combined with *Houttuynia cordata* and *A. scholaris* is used to treat fever with diarrhoea in pig. *H. sibthorpioides* found to be used for treatment of four ailments viz., indigestion and GI ulcer in cattle, weakness and low growth rate in pig, cataract in goat combined with *Oldenlandia corymbosa* and fever in pig combined with *P. foetida*, and *Leucas aspera*. Similarly, *C. longa* also found to be used for treatment of four ailments viz., indigestion in cattle combined with *Zingiber officinale*, ill joint and bone fracture in cattle, FMD in cattle, Lumpy Skin Disease (LSD) in cattle in combination with *A. indica* and *Lawsonia inermis*. *M. micrantha* was found to be used to treat three ailments in pig viz., dysentery, diarrhoea and bloat. *Ocimum tenuiflorum* was found to be used to treat three ailments viz., cough and fever in cattle, LSD in cattle and skin infection in pig. *A. indicawas* found to be used in treatment of three ailments viz., skin disease in cattle, worm in goat and LSD in cattle. *L. aspera* was used to treat three ailments such as respiratory tract infection in cattle, fever in pig and diarrhoea in poultry. *B. balcooa* were found to be used to treat worm infestation in calf, HS in cattle and ROP in goat.

Similarly, *Cyclosorus parasiticus* also found to be used in treatment of three ailments viz., tick and lice infestation in cattle, duck cholera and lethargy in poultry. The plant species used for treatment of more than one ailment were *Psidium guajava* (diarrhoea in cattle and pig), *Nicotiana tabacum* (tick and lice infestation in cattle and maggoted wound in pig), *Oldenlandia corymbosa* (fever and cough in pig and cataract in goat), *Centella asiatica* (fever in pig and poultry), *Cannabis sativa* (diarrhoea and inappetence in pig), *L. spinosa* (dysentery and worm in pig) and *C. limon* (dysentery and viral infection in pig). Remaining 26 plant species were found to be used for treatment of one ailment in different livestock and poultry.

In the present study, the effectiveness of the recorded ethnoveterinary practices, based on the feedback obtained from respondents revealed that 27 numbers of practices (43.5%) were found to be most effective against different ailments while numbers of practices that cured various ailments frequently was 20 (32.3%) whereas numbers of practices that worked occasionally against different ailments were 15 (24.2%) (Table 2).

Discussion

Significant works have been made in recent years in documenting the medicinal plants that ethnic tribes in Northeast India^{1,2,7-12} and various parts of India¹³⁻¹⁶ have traditionally used to treat animal ailments which

reflect some resemblance in case of names of plants but they vary in use for, method of preparation and mode of applications. Farmers were found to use practices in a variety of ways and dosages, which may have been attributed to the absence proper validation. It has also been observed that one specific plant species has been used for treating different ailments. *H. sibthorpioides* is mostly used for treating indigestion, cataract in goat, fever and weakness in pig which corresponds to previous study¹⁷ but the same plant however, has been identified to be used for skin conditions in both cattle and pigs¹⁸. In the same way, *C. longa*, *A. indica*, and *N. tabacum* are found to be used for treating more than one ailment¹⁹. It has also been reviewed that farmers from across the nation have the knowledge about the significant role of garlic with respect to respiratory, digestive, urinary system²⁰, while *A. indica* and *N. tabacum* in traditional veterinary ethnomedicine are used for treating mostly skin infection and deworming^{12,16,19,21} which corresponds to what our investigation revealed. Our study investigated the ethnoveterinary application of bamboo (*Bambusa balcooa*) leaves in the treatment of retention of placenta in cattle. Remarkably, our findings resonate with previous research work^{2,19,21}, shedding light on the consistent and widespread recognition of different species of bamboo (*B. arundinacea*) leaves as an effective medicinal remedy within ethnoveterinary practices. The various research results showed that *L. spinosa* contains many important nutritional and phytochemical components and root extract exhibited a potent antidiarrheal activity^{12,17}, supported their traditional use for treatment of diarrhoea protecting the gastrointestinal system. Similarly, antibacterial²² and antiviral²³ property of *C. asiatica* may act as antipyretic that corresponds to the present study. In addition to these the present findings align with the traditional use of *C. quadrangularis* in bone fracture treatment¹², use of *M. pudica* for treating fever in poultry¹⁷ and donkey²⁴. But on the contrary previous work has documented the use of *M. pudica* for treating bone fracture⁷.

The utilisation of leaves, roots, rhizomes, bulbs, fruits, seeds, stems, and bark of different plant in different combination were found to be used for treating ailments in the present study. The parallels drawn between present study and previous works emphasize the universality and enduring relevance of ethnoveterinary knowledge in addressing animal health challenges^{2,7,12,16,19,21}. Different parts of *L. spinosa* (rhizome), *M. micrantha* (leaves) and *C. limon* (fruits)

are commonly practiced for treating dysentery in pigs which was reported previously¹⁸ while decoction of offset of *L. spinosa* reported for deworming of pig earlier in another study¹⁷. Moreover, the whole plant of *C. quadrangularis* was reported earlier against treatment of bone fracture in cattle¹² which coincides with our study. Leaves of *C. sativa* and *M. micrantha* were commonly practiced against anorexia and piglet diarrhoea. A similar study on ethnoveterinary practices amongst tribal pig farmers in Karbi Anglong district of Assam suggested the usage of leaves of *C. sativa* against inappetence¹⁷. Some commonly used plant species for treating fever in cattle, pig and poultry alone or combination with other species that includes *H. sibthorpioides*, *L. aspera*, *P. foetida*, *M. pudica*, *E. prostrata*, *O. corymbosa*, *H. cordata*, *P. emblica*, *A. scholaris*. Similarly, *P. emblica*, *Z. officinale*, *C. longa*, *C. asiatica* were reported to be used against indigestion¹⁷. Practice of feeding tender leaves of *P. guajava* against diarrhoea in cattle and pig¹² oppose some previous work where it has been found to be used for treating fever^{19,24} and FMD²¹.

Conclusion

Ethnoveterinary practices passed down through generations need proper documentation and validation in the present-day context of natural farming. The present study revealed 62 numbers of traditional knowledge where 43 plant species are used to treat 33 major and minor ailments in livestock and poultry. A number of medicinal plants used in ethnoveterinary practices have become less available while some species are on the verge of extinction. Therefore, urgent emphasis should be given to maintain and preserve the floral resources and its scientific validation that help to finding of new or alternative medicines which may be the solution for accumulation of contaminants in human body through food chain. The present study will help in identification, familiarisation, and improvement of the understanding of the distribution of valuable medicinal plants in the district to farmers, environmentalists, researchers, and other stakeholders.

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Conflict of Interest

The authors declare that no conflict of interest exists in the study.

Author Contributions

PP and GG conceptualized the study, data collection and drafted the original manuscript; BK, AKS and GG reviewed and edited the manuscript; MN and PP supervised the entire study. All authors discussed the findings and contributed to the final manuscript.

Prior Informed Consent

Prior informed consent (PIC) was taken from the respondents during study for publication of this manuscript.

Data Availability

The authors declare that all the data supporting the study are available within the manuscript only.

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