Ethno-Veterinary practices used for common health ailments of sheep and goat: A participatory assessment by the Raika pastoralist of Marwar Region, Rajasthan

DEEPAK CHAND MEENA1, SANCHITA GARAI1, SANJIT MAITI1, Mukesh Bhakat2, B S MEENA1 and K S KADIAN1

ICAR–National Dairy Research Institute, Karnal, Haryana 132 001 India

Received: 23 October 2019; Accepted: 21 January 2020

ABSTRACT

The Raika pastoralists of Rajasthan have a large network of traditional healer and make use a large variety of indigenous plants, minerals and animal products to cure their diseased animals. Therefore, the present study was designed to document and appraise ethno-veterinary practices followed by the Raika pastoral community to treat common health ailments of sheep and goat like diarrhea, bloat, jaundice and fever. The study was carried out at purposively selected Marwar region of Rajasthan and a total 120 Raika pastoralists were interviewed from the six villages of Pali and Jodhpur district on an open-ended interview schedule to document the ethno-veterinary practices. For participatory assessment of the identified ethno-veterinary practices, Quantification of Indigenous Knowledge (QuIK) was applied. The Raikas were using total 15 ethno-veterinary practices to cure four common health ailments. Use of alum and jaggery was found most effective to treat diarrhea, whereas, they used only alum to treat fever. They also used mixture of turmeric, acidic butter, tea and black salt to manage bloat in their animal most effectively. To cure Jaundice of animal, they perceived use of mixture of lemon, baking soda and pepper was more effective ethno-veterinary practice. Hence, pharmacodynamics of these ethno-veterinary practices may be studied before further replication and use.

Keywords: Ethno-veterinary practices, Goat, Marwar region, Raika pastoralist, Sheep

Pastoralists depend on livestock for their livelihood. Their major sources of income are selling of animals and their products like meat, milk etc. There are, around, 120 million pastoralists across the globe (Rass 2006). Pastoralists makes a significant contribution mainly in developing counties like India in terms of animal product like meat and generating employment in rural areas. In India, more than 200 pastoral communities are living (Khurrana 1999). Raika pastoralist is one of the most important pastoralists inhabiting with seven million population in Marwar region of Rajasthan (Rollefson et al. 2004). There are two communities among the Raika, i.e. Maru (camel rearer) and Godwar (sheep rearer) (Tripathi and Rajput, 2006). Though, the Raikas are known as the camel breeder, but, sheep and goat population in their herd has increased significantly during last few decades (Dudi and Meena, 2015). Nomadic pastoralism is critically important to the economy of Rajasthan. Aridity and poor soils, especially in the western districts, make it well-suited to a combination of agriculture and livestock rearing (IRR, 1994). Every year after rainy season, Raika used to migrate along with their animals. Lack of fodder, water and marketing are the main reasons of migration of Raika and they used to migrate more than eight months in a year. During migration, they used to reach different parts of Madhya Pradesh, Uttar Pradesh and Haryana. Due to their intimate association with the animals, Raikas accumulated a large body of knowledge related to cure and management of different diseases of their animals. Raikas have very little access to modern veterinary facilities due to remote location of their migratory routes and solely depend on their traditional knowledge to treat their diseased animals. These treasure of knowledge is very little documented and there is danger of extinction of this knowledge base. Therefore, it is utmost important to document these old age practices as well as to assess their perceived effectiveness. Pharmacodynamics of the identified effective practices may be further studied and may be replicated for further use. Hence, the present study was designed to document and participatory assessment of the documented ethno-veterinary practices used to cure common health ailments of sheep and goat.

MATERIALS AND METHODS

There are 3.074 crore of small ruminant (sheep and goat) in Rajasthan which is highest populated state in India (Anonymous, 2012). Raikas mainly inhabiting in Rajasthan with seven lakh population which is 61% of the total Raika
pastoralists of India. Therefore, the present study was carried out in Rajasthan. Out of nine regions in Rajasthan, Marwar region was selected purposively due to the highest population of Raika pastoralists. Out of six districts of Marwar region, two districts, i.e. Pali and Jodhpur were selected purposively based on the highest population of the Raika pastoralist. From each district, one tehsil (Bali from Pali district and Bilara from Jodhpur district) was selected. Further, three villages from each tehsil were selected, randomly. Therefore, the present study was conducted in six villages. From each village, 20 Raikas pastoralists were selected randomly who were rearing sheep and/or goat and migrating along with their sheep and goat and they were considered as respondents for this study. Thus, total 120 Raika pastoralists were interviewed at their home and during migration with help of an open-ended interview schedule for documentation of ethno-veterinary practices with rationale used by them to treat different diseases of sheep and goat. Prior informed consent was obtained from the village headman for sharing and publishing their traditional knowledge and practice as ethno-veterinary practices to acknowledge them. While seeking informed consent, the researchers have explained the purpose of the research, its sponsors, potential benefits and possible problems associated for people and the environment, research methodology and participation of residents of the community. They were given an opportunity to read the summarized facts of research through their village headman.

Assessment of ethno-veterinary practices had been done through QuIK (Quantification of Indigenous Knowledge) method by key informants, using the method (QuIK) was developed by De Villiers (1996). The basic premise of this method is that farmers know and understand the environment in which they farm and that answers to many questions can be found in the collective experience of the farming community and doing informal experiments over years. It can be used to unpack the practices of successful farmers, so that information can be disseminated to a wider group of farmers. QuIK methodology represents a rapid and relatively cheap way to elicit ethno-veterinary practices. In QuIK, PRA tool, i.e. matrix ranking is combined with an interview schedule to elicit numerical data from key informants. Raikas were, mainly, using ethno-veterinary practices to cure four common health ailments of sheep and goat, i.e. diarrhoea, bloat, jaundice and fever. Therefore, these four health ailments were selected for the participatory assessment of the ethno-veterinary practices which were used to cure these diseases. Among the identified ethno-veterinary practices, important practices as identified by the pastoralists were considered for QuIK. Thus, four practices were selected to evaluate their comparative effectiveness to cure diarrhea. Accordingly, three practices were selected to appraise their effectiveness against bloat and jaundice; and finally five practice were evaluated in case of fever. To conduct participatory assessment, key informants were identified by Sociometric method (Moreno, 1951) among the selected Raika pastoralists those were having detailed understanding regarding selected ethno veterinary practices. Thus, 19 key informants were identified for participatory assessment of ethno-veterinary practices used to treat diarrhea and 21 key informants were identified for the assessment of the ethno-veterinary practices used to treat other three ailments viz. bloat, jaundice and fever. Four criteria or parameters, viz. availability, ease of preparation, healing effect and lower side effect, were selected to appraise comparative and relative effectiveness of the identified ethno veterinary practices. Key informants were asked to put required number of pieces of stone out of in each block of matrix as per their perception on the each criteria/parameter of the identified ethno-veterinary practices. Data from each key informant were treated as an independent result. Data collected from the key informants on several criteria were subjected to one-way analysis of variance. Duncan’s Multiple Range Test (DMRT) as modified by Kramer (1957) was followed to identify the most effective practices among the identified practices.

RESULTS AND DISCUSSION

Ethno-veterinary practices used in sheep and goats by the Raika pastoralists for different diseases

Diarrhoea: Diarrhoea is very common stomach diseases for sheep and goats in Rajasthan and, in this condition their droppings usually become soft, watery and smelly. Raikas expressed that animals were depressed and did not consume feed and fodder. Sometimes, animals had a watery, whitish-yellow or greyish diarrhoea which is known as “white scours”. Mortality amongst lambs/kids usually were high due to dehydration. A total four ethno-veterinary practices were used by the Raika pastoralists against Diarrhoea in sheep and goat (Table 1). In case of first practice, they collect fitkari (alum) and jaggery from market and mixed them with less quantity of alum with higher quantity of jaggery. Then, boiled with water for 30 min. and kept whole night and provided to animals in early morning for 4–5 days. Jaggery boosts intestinal strength due to its high magnesium content and jaggery is also loaded with antioxidants and minerals such as zinc and selenium, which in turn help to prevent free-radical damage and also boost resistance against infections. Tyagi (1994) reported same practices in his study in south–western Rajasthan, where, farmers were providing jaggery along with water to help clear off waste from uterus after delivery and also help to provide comfort to animals after delivery. In the second practice, fruits of Cucumis melo, L. syno, Cucumis callosus (Rottler) cogn. collected from nearby areas mixed with sugar and oil and water was given to animals. Raikas take, in third practice, mustard oil and half spoon of red chilies powder and mix both in cup and give to animals for 3 days in morning time and evening time. During this treatment, they did not provide green fodder to the infected animal, but, only dry fodder was given. They also believed about the utility of isabgol in control of diarrhoea and used as
Table 1. Ethno-veterinary practices used by the Raika pastoralists in Marwar region of Rajasthan for treatment of diarrhoea in sheep and goat

| Practice | Ingredients | Botanical name of used plants | Form of use | Mode of use |
|----------|-------------|-------------------------------|-------------|-------------|
| First    | Alum, Jaggery | –                             | Paste       | Fitkari (Alum) + jaggery, mix less amount of Alum with more jaggery and boil with water for 30 mins and keep whole night and provide to animals in early morning for 4–5 days. |
| Second   | Kachri (Arid fruit), Sugar, Mustard oil | Cucumis melo L. syno Cucumis Cucumis callosus (Rottler) cogn | Fruit       | Mix fruit of kachri and mixed with sugar and oil and water and given to animals. |
| Third    | Mustard oil, Red chillies | Brassica nigra, Capsicum annuum L. Oil Powder and Capsicum frutescens L. | Oil Powder | Take mustard oil and half spoon of red chilies powder and mix both in cup and give to animals for 3 days in morning time and evening time. Should not provide green fodder to affected animal. Give only dry fodder. |
| Fourth   | Isabgol | Psyllium husk | Leaves | Powder of isabgol leaves mix with water and given to animals 2–3 times in one day. |

Table 2. Participatory assessment of ethno-veterinary practices for treatment of diarrhoea in sheep and goat by the Raika pastoralists of Marwar region of Rajasthan (n=19)

| Criteria | First practice | Second practice | Third practice | Fourth practice |
|----------|----------------|----------------|----------------|----------------|
| Availability | 3.50±0.115a (I) | 1.95±0.050b (II) | 3.50±0.115a (I) | 1.05±0.050c (III) |
| Ease of preparation | 3.35±0.109a (II) | 1.35±0.109b (IV) | 3.65±0.109a (I) | 1.65±0.109b (III) |
| Healing effect | 3.20±0.092a (II) | 3.80±0.92a (I) | 1.90±0.156b (III) | 1.35±0.109c (IV) |
| Lower level of side effect | 3.15±0.196a (II) | 2.30±0.105b (III) | 1.10±0.100c (IV) | 3.45±0.170d (I) |
| Overall effect | 13.20±0.277a (I) | 9.40±0.222b (III) | 10.04±0.256b (II) | 7.50±0.235c (IV) |

(a,b,c,d means bearing different superscripts in row under each criterion differ significantly (P<0.05). The multiple comparisons are based on DMRT Post Hoc test. Values in parenthesis indicate the respective rank under each criterion).

Table 3. Ethno-veterinary practices used by the Raika pastoralists in Marwar region of Rajasthan for treatment of bloat in sheep and goat

| Practice | Ingredients | Botanical name of used plants | Form of use | Mode of use |
|----------|-------------|-------------------------------|-------------|-------------|
| First    | Turpentine, black salt, hing and linseed | Ferula assa -foetida, Linum asitatisissum | Paste and oil | Turpentine oil-100 ml. Black salt-100 g, Hing-30 g Linseed oil-500 ml. At first, 500 ml linseed oil mixed with 100 ml turpentine oil. Then, 100 g of black salt added with oil solution. Finally, 30 g of hing (asafoetida) added to the solution. This final mixture was provided to animal to drink. Water should not be provided up to 2 h of offering of the solutions. |
| Second   | Turmeric, acidic butter, Tea and black salt | Brassica napus, Nigella sativa | Powder and paste | Acidic butter + black tea + turmeric mix + black salt and given to animals. |
| Third    | Kali jiri, Rai and butter | Brassica napus, Nigella sativa | Seeds | Kali Jiri + Rai + acidic butter (buffalo, cow) mix all the materials and provide to animals for 4–5 days. |
significantly differed from first practices. Its consistence effectiveness towards each criterion and finally adjudged as the best effective practice to control diarrhoea of sheep and goat. Second practice, i.e. mixture of kachri fruits with sugar and mustard oil was having the properties of quick healing. But, collection of material and preparation complexity makes it less effective than the third practice, i.e. mixture of mustard oil and red chillies. Among these four practices, use of isabgol was the least effective practice as it takes more time to recover from diarrhoea. Isabgol is mainly used for constipation for its adsorption quality, so its uses was not found more efficient than other practices as per perception of Raika goat and sheep rearers. Though they perceived that second practices, i.e. use of Kachri (Ardis fruit), sugar and mustard oil to the small ruminants against diarrhoea was more effective in terms of healing effect than other three practices but overall effective was lesser than first practices due to its complexity in preparation and side effect.

**Bloat (Affara) in sheep and goats:** Bloat (Affara) is one health disorder of small ruminants like sheep and goat as reported by Raika pastoralists. Bloat is an excess of gases in the rumen of small ruminant animals and it should always be considered as an emergency situation. Raika reported that this type of bloat is usually caused by lush pastures heavy in legumes like clover, alfalfa. These rapidly fermenting foods produce gases more quickly than sheep can digest. A total three ethno-veterinary practices were used by the Raika pastoralists against bloat (Affara) in sheep and goat in the study area (Table 3). In case of first practice, they collected 100 ml of Turpentine oil, 100 g of Black salt, 30 g of hing and 500 ml of linseed oil. At first, they mixed two oils, then, black salt was added to this solution. Finally, 30 g of hing is added to the solution. This mixture was provided to animal. Generally, they did not offer water upto 2 hrs of providing this mixture. The components present in hing (asafoetida) have anti-bacterial, anti-spasmodic, laxative, anti-flatulent, anti-inflammatory and antiseptic properties that help deal with problems like irritable bowel syndrome (IBS), flatulence and an upset stomach. For the second practice, a paste of acidic butter, black tea, turmeric powder and black salt was prepared and given to the affected animals. Another paste of kali jiri, rai and acidic butter was prepared and used as third practice. This paste was provided to mix all the materials and provide to the affected animals for 4–5 days, consecutively.

| Practice | Ingredient | Botanical name of used plants | Form of use | Mode of use       |
|----------|------------|-------------------------------|-------------|------------------|
| First    | Palash tree flower and wood | Butea monosperma | Flower and wood | Make tea of palash flower and give to animals for 7–8 days. Boil palash tree wood in water for 2–3 h and provide to diseased animals. |
| Second   | Kheera     | Cucumis sativus               | Fruit       | Provide kheera to animals as much as possible. |
| Third    | Lemon, Meetha soda and Pepper | Citrus × limon, Piper nigrum | Juice/powder | Mix baking soda and little black pepper and mix with the lemon juice and give to animals for 4–5 days consecutively. |

For the assessment of ethno-veterinary practices, 21 key informants were interviewed with four criteria viz. availability, ease of preparation, healing effect, and low level of side effect with scoring pattern of 1–3. Matrix of decision criteria with respect to each practice for curing of blotting of sheep and goat is presented in Table 4. The second practice, i.e. mixture of acidic butter, black tea, turmeric and black salt was found to be most effective to control bloat of sheep and goat in comparison to the other two practices. All the ingredients of the second practice are easily available at the household level and easy in preparation, therefore, this practice was perceived as best effective one. Raikas perceived that the third practice, i.e. kali jiri, rai, acidic butter mixture, had the features of quick healing effect from bloat. But this practice was adjudged as the second most effective practice due to non-availability of ingredients in comparison of the second practice. The first practice was the least preferred practice among the Raika pastoral community due to the non-availability of ingredients like linseed oil, turpentine oil and hing as well as complexity in preparation than the other two practices.

**Jaundice in sheep and goats:** Jaundice is a common health ailment in sheep and goats. Therefore, Raika pastoral community followed their old age ethno-veterinary

Table 5. Ethno-veterinary practices used by the Raika pastoralists in Marwar region of Rajasthan for treatment of jaundice in sheep and goat

| Practice | Ingredient | Botanical name of used plants | Form of use | Mode of use |
|----------|------------|-------------------------------|-------------|------------|
| First    | Palash tree flower and wood | Butea monosperma | Flower and wood | Make tea of palash flower and give to animals for 7–8 days. Boil palash tree wood in water for 2–3 h and provide to diseased animals. |
| Second   | Kheera     | Cucumis sativus               | Fruit       | Provide kheera to animals as much as possible. |
| Third    | Lemon, Meetha soda and Pepper | Citrus × limon, Piper nigrum | Juice/powder | Mix baking soda and little black pepper and mix with the lemon juice and give to animals for 4–5 days consecutively. |
practices to control jaundice. Generally, they follow three practices for treatment of jaundice of their sheep and goat. A brief description of these three ethno-veterinary practices is presented in Table 5. In case of first practice, the Raika pastoralists collected flower of *Butea monosperma* from forest and crushed the flower and made tea and gave to diseased animals directly for 7–8 days. Singh *et al.* (2013) also reported that Raika pastoralists use flower of *Butea monosperma* for the treatment of the jaundice of their animal. But Yadav *et al.* (2014) revealed that powder of seeds of *Butea monosperma* is used to kill the maggots. Raikas also provide *Cucumis sativus* to the diseased sheep and goat *ad lib.* for quick healing. They also prepare a solution of baking soda, black pepper and lemon juice and give to the animal for 4–5 days consecutively.

A participatory assessment was conducted among the 21 key informants to identify the best practice for treatment in sheep and goat jaundice used by the Raika pastoralists. All the three practices were assessed based on the four criteria namely availability, ease of preparation, healing effect and low level of side effect pattern. The result of the participatory assessment is presented in the Table 6. The third practice, i.e. mixture of lemon, soda and pepper was perceived as the best one in all four categories of participatory assessment. Therefore, this practice was considered as the most effective ethno-veterinary practice to control sheep and goat jaundice. In terms of overall effectiveness, first and second practice did not have any difference at P<0.05. But, the second practice was considered as the second most effective ethno-veterinary practice used by the Raika pastoral community to control sheep and goat jaundice due to their healing effect in comparison to the first practice.

**Fever in sheep and goat:** A total five ethno-veterinary practices were used by Raika pastoralists for the treatment of fever of sheep and goat. A brief detail of each practice is given in Table 7. Raika pastoralists use alum (*fitkari*) as Ramban. They always carry alum with them during migration and use whenever it is required. Raikas used five ethno-veterinary practices to control fever of their sheep and goat. In the first practice, they prepare a mixture of onion (leaves), *ajwain*, *dhania* and jaggery; and give to the diseased animals. They used alum 2–3 days continuously to control fever. Sometimes, they mixed fenugreek and rock salt with alum and gave to the animals without water. They even add turmeric powder with alum and give to the animals for continuous two days to control fever. They also believed that yellow brinjal can control fever of sheep and goat and used as fifth ethno-veterinary practices.

A total 21 key informants from the Raika pastoral community participated in the participatory assessment of the of the five ethno-veterinary practices used by them for treatment of fever of their sheep and goat. Assessment of each practice was done based on the four criteria, i.e. availability, ease of preparation, healing effect and low level of side effect pattern. The result of the decision matrix of the response of the key informants is presented in Table 8. Use of alum alone was found to be the most effective ethno-veterinary practice to control fever of sheep and goat in comparison with other four practices. Healing time from fever was highly delayed when alum

### Table 6. Participatory assessment of ethno-veterinary practices for treatment of jaundice in sheep and goat by the Raika pastoralists of Marwar region of Rajasthan (n=21)

| Criteria               | First practice | Second practice | Third practice |
|------------------------|----------------|-----------------|----------------|
| Availability           | 1.67±0.105     | 1.33±0.105      | 3.00±0.000     |
| Ease of preparation    | 1.86±0.143     | 1.38±0.129      | 2.76±0.118     |
| Healing effect         | 1.14±0.078     | 2.33±0.159      | 2.52±0.112     |
| Lower level of side effect | 1.71±0.197     | 1.95±0.201      | 2.33±0.105     |
| Overall effect         | 6.38±0.327     | 7.00±0.365      | 10.62±0.189    |

A,b,c means bearing different superscripts in row under each criteria differ significantly (P<0.05). The multiple comparisons are based on DMRT Post Hoc test. Values in parenthesis indicate the respective rank under each criterion.

### Table 7. Ethno-veterinary practices used by the Raika pastoralists in Marwar region of Rajasthan for treatment of fever in sheep and goat

| Practice | Ingredients | Botanical name of used plants | Form of use | Mode of use |
|----------|-------------|-------------------------------|-------------|-------------|
| First    | Onion, ajwain, fenugreek and jaggery | *Allium cepa*, *Trachyspermum annii*, *Coriandrum sativum* | Leaves powder and paste | Onion (leaves) + ajwain + dhania + jaggery; mix all the items and given to animals. |
| Second   | Alum        | –                             | Paste       | Make paste of Alum and given to animals followed by water for 2–3 days. |
| Third    | Fenugreek, rock salt, and fitkari | *Coriandrum sativum* | Powder and paste | Fenugreek + Rock salt + Alum; Mix all and make powder and provide to animal without water. |
| Fourth   | Turmeric and fitkari | *Cucumina longa* | Powder and paste | Make powder of turmeric and alum, then, give to animal for 2 days. |
| Fifth    | Brinjal     | *Solanum melongena*           | Fruit       | Mix yellow brinjal in cold water and give to animals. |
was used alone, but, due to the easy availability, no preparation and no side effect it was considered most effective ethno-veterinary practice. On the other side, use of yellow brinjal can control fever of sheep and goat very quickly. But, availability of yellow brinjal was a matter of concern for the Raikas. Therefore, this practice was considered as the fourth most effective ethno-veterinary practice. Accordingly, collection and preparation of the ingredients of the first practice, i.e. mixture of onion leaves, ajwain, dhania and jaggery made it least effective ethno-veterinary practice against fever of sheep and goat.

The Raika pastoralists of the Marwar region of Rajasthan depend on the ethno-veterinary practices for the treatment of the common health ailments of their sheep and goat due to their migratory way of life and non-accessibility of modern veterinary practices. Participatory assessment appraised that use of mixture of alum and jaggery was most effective to treat diarrhoea; use of turmeric, acidic butter, tea and black salt was best to treat bloat; juice and powder of lemon, baking soda and pepper was applied and found most effective to treat jaundice and use of dry alum was found to be most effective practice for fever control in sheep and goat. Concerns regarding efficacy, quality, safety and dose standardization remain. Hence, it is an urgent need to evaluate the pharmacodynamics of these ethno-veterinary practices before further replication and use.

REFERENCES
Anonymous. 2012. 19th Livestock census - 2012 All India Report. Ministry of Agriculture Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi.
De Villiers K Anne. 1996. Quantifying indigenous knowledge: A rapid method for assessing crop performance without field trials. AgREN Network Paper No 66, ODI Agricultural Research and Extension Network.
Dudi A and Meena M L. 2015. Ethnoveterinary medicine used by goat keepers in Marwar region of Rajasthan, India, Indian Journal of Traditional Knowledge 14(3): 454–60.
IIRR. 1994. Ethno-veterinary medicine in Asia, an information kit on traditional animal health care practices, IIRR, Philippines, 330–338.
Khurana I. 1999. The Milk that Ate the Grass. Down to Earth, April 15 1999: 24–31.
Köhler-Rollefson I and Rathore H S. 2004. Indigenous versus official knowledge, concepts and institutions: Raika pastoralists and the outside world. Nomadic Peoples 8(2): 150–67.
Kramer C Y. 1957. Extension of multiple range tests to group correlated means. Biometrics 13: 13–18.
Moreno J L. 1951. Sociometry, experimental method, and the science of society, Ambler, PA: Beacon House, 1951.
Rass N. 2006. Policies and strategies to address the vulnerability of pastoralists in sub-Saharan Africa. PPLPI Working Paper No. 37.
Singh D, Kachhawaha S, Choudhary M K, Meena M L and Tomar P K. 2014. Ethnoveterinary knowledge of Raikas of Marwar for nomadic pastoralism. Indian Journal of Traditional Knowledge 13(1): 123–31.
Tripathi H and Raiput D S. 2006. Customs and beliefs of Raika pastoralists of Rajasthan associated with camel husbandry, Indian Journal of Traditional Knowledge 5(2): 284–86.
Tyagi S. 1997. ‘Traditional wisdom in animal husbandry among farm women’. MVSc Thesis, College of Home Science, Udaipur, Rajasthan.
Yadav M L. 2014. ‘Livestock management practices followed by tribes in Banswara district of Rajasthan’. Doctoral dissertation, Rajasthan University of Veterinary and Animal Sciences, Bikaner 334001.

Table 8. Participatory assessment of ethno-veterinary practices for treatment of fever in sheep and goat by the Raika pastoralists of Marwar region of Rajasthan (n=21)

| Criteria              | First practice | Second practice | Third practice | Fourth practice | Fifth practice |
|-----------------------|----------------|-----------------|---------------|----------------|---------------|
| Availability          | 2.00±0.00d     | 4.86±0.078a     | 3.00±0.00c     | 4.14±0.078b    | 1.00±0.00e     |
| Easy in preparation   | 1.38±0.176b    | 4.90±0.066a     | 3.05±0.263b    | 3.48±0.148b    | 2.14±0.143c    |
| Healing effect        | 3.48±0.328a    | 1.67±0.174b     | 1.86±0.143b    | 3.90±0.153b    | 4.10±0.228a    |
| Lower level of side effect | 1.90±0.206b | 4.05±0.263a     | 2.24±0.168b    | 2.43±0.289b    | 2.43±0.289b    |
| Overall effect        | 8.76±0.625a    | 15.48±0.406a    | 10.14±0.427c   | 13.95±0.312b   | 9.67±0.392c    |

a, b,c,d,e means bearing different superscripts in row under each criteria differ significantly (P<0.05). The multiple comparisons are based on DMRT Post Hoc test. Values in parenthesis indicate the respective rank under each criterion.