Original Research

Adoption and Perceived Effectiveness of Indigenous Technical Knowledge among Tribal Farmers for Bovine Management: An Exploratory Study

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Rec. Date:	Sep 21, 2018 19:49
Accept Date:	Nov 24, 2018 15:43
DOI	10.5455/ijlr.20180921074902

Abstract

The present study aimed at elucidating indigenous technical knowledge (ITK) practices of tribal farmers of Himachal Pradesh where, Gujjar tribe's population is more and they depend on dairy farming for their livelihood. A total of 110 indigenous practices were documented and only forty three indigenous practices were found scientifically rational which could be further assessed, documented and propagated for the benefit of farming community. Of the total forty three validated practices, eight were related to digestive system; six were related to reproductive system, twenty nine were related to management practices related to limbs, skin and nasal cavity. Two filters were applied to identify the ITK. The first filter was rationality. Only rational ITK practices having rationality score greater than 2.5 were explained in this study. The second filter was mean perceived effectiveness index (MPEI). The perceived effectiveness and adoption rate analysis of these valid forty three ITKs indicated that, fifteen practices were highly effective (>2.5) with more than 50% of adoption rate among the respondents, twenty four were effective (2 to 2.5) and four practices were found as less effective (<2) with their adoption rate of 39% and 18%, respectively.

Key words: Adoption, Bovine Management, ITK, Perceived Effectiveness, Scientific Rationality

How to cite: Rai, C., Singh, K., Lal, S., Arti, & Azad, A. (2019). Adoption and Perceived Effectiveness of Indigenous Technical Knowledge among Tribal Farmers for Bovine Management: An Exploratory Study. International Journal of Livestock Research, 9(2), 243-253. doi: 10.5455/ijlr.20180921074902

Introduction

People, who are still untouched by the lifestyle of the modern world, called the tribes. India is the home to large number of such indigenous people (Rai *et al.*, 2018). In Himachal Pradesh, one of the prevalent tribe is Gujjar which are yet reliant on their ancestral profession of dairying and involve themselves in buffalo rearing and selling of milk and milk products (Rai *et al.*, 2017). They live mostly in hilly forest areas of Himalayas. From a long time back, people, specifically, poor and marginal farming society around the

world, have been using locally accessible plant resources for preparing a variety of plant based medicines for treatment of animal diseases as a cost-effective, easily available, effectual and ecologically sustainable means to animal health care practices (Kumar and Singh, 2011). The ITKs are time tested knowledge and experiences of the people in dealing with situations and problems in varying aspects of life and such knowledge and practices are special to particular culture. Indigenous technical knowledge systems are changing from generation to generation through contact with other localities and cosmopolite knowledge systems as well as through specific process of creativity and innovativeness, finally tuned, adopted both biologically and socially to counter the process of what are often harsh and inimical environment and often represent many years of adaptive evolution. This technical knowledge practices finds greater applicability in management of bovine in general and treating of various cattle diseases in particular. ITKs have been passing on from one generation to another by oral transmission and thought to be the holistic approach for dairy management (Devaki and Mathialagan, 2015). Traditionally, farmers prefer to more than one measure to solve the problem of dairy animals, i.e. adoption of traditional practices alone and/or traditional practices with allopathic medicines (Bodapti and Chander, 2013).With this backup the present study was carried out to make effort in this direction and specifically attempts to identify, document and validate the indigenous livestock and animal husbandry practices of the Gujjar tribal farmers in the Himachal Pradesh.

Material and Methods

This study was conducted in Sirmaur and Una district of Himachal Pradesh, where a huge population of Gujjar tribe resides with their ancestral occupation i.e. dairy farming. They are good manager of their dairy farms and they are using their traditional technical knowledge which are percolated from generation to generation to treat the dairy animals and solve the immediate problems pertains to dairy farming. Two blocks from each selected district and two villages from each selected block were considered for data collection. Thus total eight villages and 160 tribal household were selected for identification and documentation of practices pertaining to dairy farming as ITKs. Validation of ITKs was done through rationality index and Mean Perceived Effectiveness Index (MPEI) of ITKs. To judge the rationality of ITKs, rationality index was used. After documenting the various indigenous practices from the tribal farmers, the documented practices were sent to 60 experts working in field of animal sciences to assess the scientific rationality of ITKs in a form of specifically constructed questionnaire. The rationality of indigenous technologies was assessed by using the scoring procedure which was also used by Venkatesan and Sundaramari (2014) with slight modification. The 60 experts returned the interview schedule after assigning the score from one to four to each ITK based on their assessment of scientific rationality as per Table 1. To calculate the rationality of each ITK, the total and mean scores assigned by all experts to individual ITK was calculated. Based on the mean score, ITKs were classified into two categories i.e. rational (mean score

 DOI 10.5455/ijlr.20180921074902

≥2.5) and irrational (mean score <2.5). After determination of rationality of ITKs, their adoption and perceive effectiveness were studies using structured interviews.

Table 1: Scoring procedure to assess the rationality of indigenous practices

S. No.	Responses	Scores
1	Rational based on scientific evidence from related studies	4
2	Rational based on logical thinking derived from experience	3
3	Irrational based on logical thinking derived from experience	2
4	Irrational based on scientific evidence from related studies	1

To find out the degree of adoption of ITK practices among the non-sample respondents in the study area, thirty tribal farmers were selected to calculate adoption index and it was measured in two point continuum whether they had adopted the ITKs or not. The scores awarded by all respondents for a particular ITK were summed up to work out adoption index of a particular ITK practice through following formulae (Sundaramari *et al.*, 2003).

$$Adoption\ index\ of\ ITKs = \frac{Number\ of\ farmers\ adopted}{Number\ of\ farmers\ having\ applicability\ of\ ITKs} \times 100$$

Perceived effectiveness of ITKs is defined as the degree to which the farmers perceive that a positive outcome is obtainable by applying the ITKs in solving the problems (Sundaramari *et al.*, 2003). The perceived effectiveness of rational ITKs was measured by using the MPEI procedure developed and used by Venkatesan and Sundaramari (2014) with slight modification. The MPEI contained of five attributes, which are given in Table 2 with their relevancy weightage.

Table 2: Inventory of 5 traits with their relevancy weightage

S. No.	Traits of ITKs	Relevancy Weights
1	Effectiveness	0.86
2	Ease in preparation	0.78
3	Availability	0.79
4	Cost effectiveness	0.85
5	Side effects	0.68

The response of tribal farmers was taken in form of rating of each ITK on three point continuum (Agree–3, Undecided–2, Disagree–1) based on the above traits. If R1, R2, R3,…. R5 were to be the relevancy a weight of the five traits, and then the perceived effectiveness index (PEI) was calculated as follow-

$$PEI = \frac{W1R1 + W2R2 + W3R3 + W4R4 + W5R5}{R1 + R2 + R3 + R4 + R5}$$

Where, W1, W2…….W5 were the scores obtained for the traits for an ITK for a respondent. To get MPEI for a specific ITK, the mean score of PEIs acquired from every one of the respondents for a specific

DOI 10.5455/ijlr.20180921074902

ITK were calculated. Hence, those ITKs which were having the MPEI value between 2 to 2.5 were deliberated as effective ITKs and MPEI of 2.5 and above were considered as highly effective.

Results and Discussion

ITK Practices among the Tribal Farmers

A total of 110 ITKs related to management of bovine were documented and classified based on three technological dimensions i.e. digestive system, reproductive system and limb, skin and nasal cavity (Table 3). However, only forty three ITK practices were rational and considered as valid ITKs. All the ITKs were screened by the experts having expertise in dairy and animal sciences. Amid the process of screening, the ITKs that are well established actualities, less habitually specified by the respondents and perceived as irrational were removed. The study highlights that most of the documented valid ITKs (67.44%) belonged to limb, skin and nasal cavity dimension, 18.60% belonged to digestive system and 13.96% belonged to reproductive system. Among forty three ITK practices, fifteen practices were highly effective (mean score value >2.5), twenty four were effective (mean score value 2 to 2.5) and four practices were found as less effective (mean score value <2).

Scientific Rationality of ITKs

During the rationality analysis, the experts either declared the ITKs as rational by supplementing them with scientific facts or declared irrational based on their logical thinking and experience. The experts rated the ITKs between rationality score of 1 to 4. The ITKs which received score more than 2.5 as mean score were considered as rationale. Of the 110 practices evaluated, 43 were rational (39.09%) while the remaining 67 were rejected as irrational (60.01%). Among the many documented indigenous practices (Table 3), only 43 valid ITKs which were 'rational and highly effective' are hereby explained and discussed with its rationality score, perceived effectiveness index, adoption rate and scientific rationale behind its usage.

Adoption and Perceived Effectiveness of Rationale ITKs

As all the valid and rational ITKs are listed in Table 3. In case of treatment for constipation, the documented ITK was rated as rational (3.01), perceived as highly effective (2.60) and adopted by 78% of the respondents as Ajwain (*Trachyspemum ammi)*, salt, jaggery (Gur) and mustard seeds (*Brassica compestris*) are easily available in locality and hence very cost effective. Rationally, mustard oil have stimulant, irritant, appetizer, cordial diaphoretic and tonic substances and ajwain seed increases gastro intestinal secretion which enhances the efficiency of digestive systems. The results are in line with findings of Tiwari and Pande (2004).

 DOI 10.5455/ijlr.20180921074902

Table 3: ITKs pertaining to dairy management with scientific rationality, MPEI and their adoption

Indigenous Technical Knowledge (ITK) Practices		Rational	MPEI	Adoption %	Remark
1. Effect on Digestive System					
Treatment for Constipation					
ITK 1	50g Ajwain (*Trachyspemum ammi)* seed added to 50g salt with 50g mustard seeds (*Brassica compestris*) and 100g Jaggery. This needs to be given to dairy animals twice a day till recovery.	3.01	2.6	78	HE
ITK 2	Kadha made from 50g Brahmijiri *(Tagetus minuta)* and 50g Ajwain *(Trachyspemum ammi)* boiled with 100g Jaggery in one and half litre of water for 10 to 15 minutes. This is given twice a day till recovery.	2.56	2.1	30	E
Treatment for diarrhoea					
ITK 3	Pound 100g Amarbel *(Cuscuta reflexa)* with 100g rice flour *(Oryza sativa)*. This is administered to animal twice a day till recovery.	3.1	2.51	68	HE
ITK 4	250g sheera solution (Sugar) in half litre water or 250g khamir solution (yeast) in half litre of water is given to animals twice a day till recovery.	2.67	2.39	70	E
Treatment for tympany					
ITK 5	25g onion (*Alium cepa*), 20g garlic (*Allium sativum*), 20g ajwain (*Trachyspemum ammi)* and mix with 100 g salt and 50g rice flour (*Oryza sativa)* and fed to animals thrice a day till recovery.	3.06	2.61	78	HE
ITK 6	300ml of Pepsi or Coca cola or 250ml of alcohol and 300ml soda is given to animal once in a day till recovery.	3.54	2.12	27	E
ITK 7	50g Ajwain (*Trachyspemum ammi)* or Himalayan Batisa (concentrate brand) is fed to animals once in a day till recovery.	3.61	2.53	63	HE
ITK 8	50g Ajwain (*Trachyspemum ammi*, 50g bitter saunf *(Foeniculum vulgare)* along with 5g black salt is fed to animal once in a day till recovery.	3.4	2.45	76	E
2. Effect on reproductive system					
For removal of retained placenta					
ITK 9	Half kilo gram bark of simbal tree (*Bombax ceiba*) and 100g Jaggery boiled in one and half litre of water is given to animal daily for one week.	3.02	2.09	61	E
ITK 10	Khada of half kilogram leaves and stems of nebleki punch plant, half kg bark of simbal (*Bombax ceiba*) and 100g Jaggery is given to animal daily for one week.	2.52	2.29	68	E
ITK 11	Feeding of sugarcane and 2-3 kilogram boiled concentrate daily for one week.	2.6	2.32	45	E
Treatment for anoestrous					
ITK 12	200g Jaggery, 200g maize flour (*Zea mays*), 200g linseed cake (*Linum usitatissimum*) and 200g Bengal gram (*Cicer arietinum*) soaked in two litre of water for the whole night. This needs to be given to dairy animals twice a day till recovery.	3.34	2.12	59	E

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Treatment for prolapse					
ITK 13	Feeding of half to one kilogram fenugreek leaves (*Trigonella foenum-graecum*), 300 ml alcohol and washing of reproductive organ with alcohol on Ad libitum.	2.7	2.43	54	E
Treatment for repeat breeding					
ITK 14	Adlib kachnar leaves (*Bauhinia variegate*) and feeding of less concentrate mixture.	3.1	2.03	23	E
3. Effect on limb, skin and nasal cavity					
Treatment for epistaxis					
ITK 15	25g Ritha (*Sapindus laurifolius*) solution in 100 ml water through nasal opening of the cows, if the disease is caused due to leaches. This needs to be given to dairy animals once or twice a day till recovery.	3.12	2.4	47	E
ITK 16	Cool bath of animal and half kilogram leaves of a dhudha petha are fed daily to animals.	2.98	2.56	76	HE
ITK 17	250ml mustard oil (*Brassica compestris*) orally fed to dairy animals twice a day till recovery.	2.95	2.6	85	HE
ITK 18	Half litre banana (*Musa paradisiaca*) stem juice orally fed to dairy animals twice a day till recovery.	3	2.23	35	E
Treatment for ecto-parasitic infestation					
ITK 19	Massage of animals with the mixture obtained by 100g cow dung cake and 100g salt once in a day.	2.5	1.98	15	LE
ITK 20	Salt massage of dairy animals with the paste obtained by 100g soot (kalikh) and 100ml mustard oil (*Brassica compestris*) followed by washing the animal with washing powder. Soot thrice a day followed by washing twice a day.	2.58	2	19	E
ITK 21	Phenyl tablets are crushed and mixed in linseed oil (*Linumusitatissimum*) and applied on animal once in a day.	2.93	2.14	36	E
ITK 22	10ml Eucalyptus oil (*Eucalyptus globulus*), 10ml mustard oil along with 10ml kerosene oil applied on animal once in a day.	3.19	2.08	12	E
Treatment for fracture in dairy animals					
ITK 23	Bamboo splints are dressed. Dressing, any bark of tree from the fractured part and dressing is changed after 15-20 days.	3.53	2.15	54	E
Treatment for dermatomycosis (fungal infection of skin)					
ITK 24	Paste obtained by 100g pound black pepper (*Piper nigrum*) with 50ml mustard oil (*Brassica compestris*) and half litre butter milk can administered to dairy animals.	3.67	2.59	69	HE
Treatment for wound caused in body of animals					
ITK 25	Paste obtained by 50g turmeric powder (*Curcuma longa*) in mustard oil (*Brassica compestris*) is applied to animal thrice a day.	2.73	2.52	74	HE
ITK 26	Paste obtained by 50g ground alum (fitikari), 100g turmeric powder (*Curcuma longa*) and 100ml mustard	3.2	2.6	72	HE

DOI 10.5455/ijlr.20180921074902

	oil (*Brassica compestris*) is applied to animal twice in a day till recovery.				
ITK 27	100g roots of akhae plant (*Rubusellipticus*), 25g alum (fitikari), 50g turmeric powder (*Curcuma longa*) and 50g soot (kalikh) in mustard oil (*Brassica compestris*) are applied to wounded part of animal body twice a day till recovery.	2.57	1.86	18	LE
ITK 28	Kadha of 100g Eucalyptus bark (*Eucalyptus globulus*) is fed to the animals once in a day till recovery.	2.83	1.99	27	LE
ITK 29	10g Turmeric (*Curcuma longa*), 10g black salt and 10gram dalda ghee are used to apply in wound once in a day till recovery.	3.65	2.58	57	HE
Treatment for endo-parasitic infestation					
ITK 30	Solution obtained by 50g ground black pepper (*Piper nigrum)* and 50 g salt in 250 ml of mustard oil *(Brassica compestris)* is applied to animal twice in a day till recovery.	3.69	2.65	81	HE
ITK 31	Mixture obtained by grinding of 50g Ajwain (*Trachyspemum ammi)*, 50g jaggery, 50g salt and 50g bitter gourd (*Momordica charantia*) leaves with 50g wheat flour (*Triticum aestivum)* in 100ml water and fed to animals twice a day.	3.43	2.54	76	HE
ITK 32	250g mehndi (*Lawsonia inermis*) solution in half litre mustard oil (*Brassica compestris*) is fed to animal orally after insemination to avoid contamination.	2.54	2.06	41	E
Treatment for intoxication					
ITK 33	250g lantana (*Lantana camara*) leaves on the mouth of animals before going for first grazing.	3.09	1.85	13	LE
ITK 34	250ml radish (*Raphanus raphanistrum* subsp. *Sativus*) extract and salt or 100ml amla (*Phyllanthus emblica*) extract and salt are applied to animals orally twice a day.	2.56	2.03	25	E
ITK 35	250ml banana *(Musa paradisiaca)* stem extract and 50g salt are fed to animals orally twice a day.	2.98	2.01	31	E
ITK 36	Feeding the mixture obtained by cutting one kilogram banana stem *(Musa paradisiaca)*, 250g salt and 100g wheat flour (*Triticum aestivum)* to animals twice a day till recovery.	3.15	2.37	43	E
Treatment for eye infection					
ITK 37	10g kungu (*Terminalia catappa*) is crushed and 10g sugar is crushed and applied in the eyes once a day.	3.57	2.19	10	E
ITK 38	10g sugar is crushed, 10g salt crushed, fruit of kainth tree (*Pyruspashia*) are grinded and applied twice a day.	3.49	2.08	27	E
Treatment for yoke gall					
ITK 39	10g sugar, 1 dead bat (nocturnal), along with 10g butter applied at the affected place for week.	2.58	2.19	11	E
ITK 40	10g butter, 10g raw turmeric (*Curcuma longa*), 10g ghee and 10g black salt is applied at the affected place for week.	2.56	2.3	36	E

DOI 10.5455/ijlr.20180921074902

Treatment for fever in dairy animals					
ITK 41	50g Gur (Jaggary), 50g clove (*Syzygium aromaticum*), 50g Ajwain (*Trachyspemum ammi)*, 50g ginger (*Zingiber officinale*), 10 pieces of black pepper (*Piper nigrum)* and 50g methi (*Trigonella foenum-graecum*) mixed in 1 liter water and fed to animals once a day till recovery.	3.01	2.53	54	HE
Treatment for cough and cold					
ITK 42	Egg and desi ghee (1 egg in 100g desi ghee) are given to animal once in aday.	2.53	2.57	65	HE
ITK 43	Massaging of animal body with paste of Jaiphal (*Myristica fragrans*) and mustard oil (*Brassica compestris)* once in a day.	3.06	2.61	75	HE

**MPEI- Mean perceived effectiveness index; HE-Highly effective; E-Effective; LE-Less effective*

The ITK related to treatment of diarrhoea were rated as rational (3.10), perceived as highly effective (2.51) and adopted by 68% of respondents as Amarbel *(Cuscuta reflexa)* and rice flour *(Oryza sativa)* are easily available with respondents without any cost. They have collected leaves of Amarbel *(Cuscuta reflexa)* from their field and rice flour (*Oryza sativa*) was easily available in their home. Similar results have been revealed by Tiwari and Pande (2004). The ITK available to treat the tympany disease was rated as rational (3.06), perceived as highly effective (2.61) and adopted by 78% of respondents as onion (*Alliumcepa*), garlic (*Allium sativum*), ajwain (*Trachyspemum ammi),* Pepsi or Coca cola and bitter saunf *(Foeniculum vulgare)* are easily and locally available among Gujjar tribal famers. Ajwain is known for antibacterial, gastro-intestinal secretions and prevent from stomach disorder and saunf is known for carminative property. The findings of the study are in agreement with Pande *et al.* (2007) and Sharma (2012). The documented ITKs for removal of retained placenta were rated as rational (3.02), perceived as effective (2.09) and adopted by 61% of respondents as bark of simbal tree (*Bombax ceiba*), Jaggery and sugarcane leaves are easily available to Gujjar farmers. The rationale behind its usage was that these ingredients provide warmth and strength to animal body and it helps to expel out the retained placenta within 1 to 2 hours. These results are in agreement with the findings of Yadav *et al.* (2015). Nivas *et al.* (2013) also found that ITK practices as very useful in removal of retained placenta. Shubeena *et al.* (2018) also reported that jaggery (Gur), turmeric and sugar was effective in removal of retained placenta. Anoestrous is an important problem in buffalo; the documented ITK to overcome this problem was rated as rational (3.34), perceived by respondents as effective (2.12) and adopted by 59% of the respondent in study area as Jaggery, maize flour (*Zea mays*), linseed cake (*Linum usitatissimum*) and Bengal gram (*Cicer arietinum*) are locally available material to tribal farmers and cost effective. For treatment of prolapse the document ITK among tribal farmers was rational (2.7), perceived as effective (2.43) and adopted by 54% of tribal farmers in the study area as fenugreek leaves (*Trigonella foenum-graecum*) and alcohol are easily available.

DOI 10.5455/ijlr.20180921074902

Repeat breeding is also a major problem among tribal dairy farmers and the documented ITK was rated as rational (3.10), perceived as effective (2.03) and adopted by 23% of respondents as in case of repeat breeding is very difficult to overcome this problem. ITKs related to treatment of epistaxis were rated as rational (3.12), perceived as effective (2.4) and adopted by 47% of respondents as Ritha (*Sapindu slaurifolius*), mustard oil (*Brassica compestris*) and banana (*Musa paradisiaca*) stem juice are locally available as well as cost effective. Documented ITKs related to overcome the problem of ecto-parasitic infestation were rated as rational (2.93), perceived as effective and adopted by 36% of respondents as cow dung cake, mustard oil (*Brassica compestris*), soot (kalikh), linseed oil (*Linum usitatissimum*) and eucalyptus oil (*Eucalyptus globulus*) are easily available to tribal farmers and cost effective also. ITK related to treatment for fracture in dairy animals was rated as rational (3.53), effective (2.15) and adopted by 54% of tribal farmers as bamboo splints are available in farmers field. Dermatomycosis (fungal infection of skin) was major problem during summer and rainy season; documented ITK to treat this disease was rated as rational (3.67), perceived as effective (2.59) and adopted by 69% of respondents as black pepper (*Piper nigrum*), mustard oil (*Brassica compestris*) and butter milk available at the farmers home. ITKs documented to cure wound caused in body of animal due to some injury or accident were rated as rational (2.73), highly effective (2.52) and adopted by 74% of respondents as the gradient of ITKs viz., turmeric powder (*Curcuma longa*), mustard oil (*Brassica compestris*), ground alum (fitikari), eucalyptus bark (*Eucalyptus globulus*) and dalda ghee are available to the respondents easily and are very cost effective. Rationally, turmeric contains curcumin, a substance with powerful anti-inflammatory and antioxidant properties and helpful in treating injury of animal body parts and mustard oil is known for its antifungal and antibacterial properties. These results are in agreement with the findings of Khateeb *et al.* (2015).

ITKs documented related to treatment of endo-parasitic infestation were rated as rational (3.69), perceived as highly effective (2.65) and adopted by 81per cent of respondents as grounded black pepper (*Piper nigrum),* mustard oil *(Brassica compestris),* ajwain (*Trachyspemum ammi),* jaggery, bitter gourd (*Momordica charantia*) leaves, wheat flour (*Triticum aestivum)* and mehndi (*Lawsonia inermis*) are locally available and are cost effective. ITKs related to cure intoxication were rated as rational (3.15), effective (2.37) and adopted by 43% of respondent as lantana (*Lantana camara*), radish (*Raphanus raphanistrum* subsp. *Sativus*), amla (*Phyllanthus emblica*), banana *(Musa paradisiaca)* stem and wheat flour (*Triticum aestivum)* are easily available to farmers. Banana *(Musa paradisiaca)* has antioxidant, anti-microbial and anti-ulcerogenic properties which make it suitable to use against intoxication in dairy animals (Anbazhagan *et al.*, 2017). ITKs pertain to cure eye infection were rated asrational (3.49), perceived as effective (2.08) and adopted by 27% of respondents as kungu (*Terminalia catappa*) and kainth tree (*Pyrus pashia*) are available in the local forest. ITK related to treatment of yoke gall in cattle were rated as rational (2.56), effective (2.30) and adopted by 36% of respondents as turmeric (*Curcuma longa*), ghee, black salt and

 DOI 10.5455/ijlr.20180921074902

butter are easily available to tribal farmers. Documented ITK for treatment of fever in dairy animals was rated as rational (3.01), perceived as highly effective (2.53) and adopted by 54% of respondents as Gur (Jaggary), clove (*Syzygium aromaticum*), ajwain (*Trachyspemum ammi)*, ginger (*Zingiber officinale*), black pepper (*Piper nigrum)* and methi (*Trigonella foenum-graecum*) are locally available in the study area. Rationally, ginger is known for anti-inflammatory and anti-viral. These results were in agreement with the findings of Ponnusamy *et al.* (2009). ITKs related to treatment for cough and cold were rated as rational (3.06), perceived as highly effective (2.61) and adopted by 75% of respondents as egg, desi ghee, Jaiphal (*Myristica fragran)* and mustard oil (*Brassica compestris)* are easily available in study area and cost effective.

Conclusion

The present study has documented 43 ITK practices on dairy management from the Gujjar tribes of Himachal Pradesh. ITKs rated as rational by the subject matter specialist were only taken in the present study. Though all the rational practices were adopted extensively and perceived as effective and few were less effective. Conducting extension campaigns or awareness programmes on these rational ITKs can help the other farmers to get its benefit. The renaissance of these indigenous systems can provide self-reliance dairy management. There is an urgent need of a comprehensive analysis and more rigorous scientific validation of these ITKs practices and popularise them amongst the farmers for its wider adoption. A scientific blend of both traditional wisdom with modern remedies practiced by the researchers, extension worker, local healers, farmers and the government and non-government organizations would lead to conservation of our rich wisdom for our future generations.

Acknowledgement

This paper is based on the M.Sc. thesis submitted to ICAR-NDRI, Karnal (Deemed University) by the first author. The authors express their sincere gratitude to tribal farmers of study area as well as ICAR-NDRI, Karnal for supporting the research and also thankful to ICAR, New Delhi for financial support in the form of JRF.

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DOI 10.5455/ijlr.20180921074902