Int.J.Curr.Microbiol.App.Sci (2021) *10*(03): 1358-1368

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 10 Number 03 (2021)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2021.1003.166

Knowledge Level and Adoption of Dairy Business-related Practices Amongst Maldharis in and around Gir National Park & Sanctuary

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Keywords

Diary business, Maldharis, Survey, Knowledge, Practices, Gir National Park & Sanctuary

Article Info

Accepted:
12 February 2021
Available Online:
10 March 2021

A B S T R A C T

India holds a reputable position in terms of milk production and number of milch animals throughout the world. The real question arises when the quality of this milk and milk products is adjudged as not-suitable for export from India to many countries. The quality of milk has direct relationship with the knowledge on animal husbandry and dairy business-related practices amongst marginal as well as commercial milch animal farm owners. So far, extensive investigations and extension surveys have been carried out with regards to socio-economic status, knowledge level and adoption of dairy business practices, and constraints faced by milch animal owners of urban and rural areas of India. However, an extensive survey on such aspects was lacking for Maldhari people in and around the Gir National Park & Sanctuary, Sasan Gir, Gujarat. The present paper highlights important findings of a retrospective survey on yet-to-be-explored animal husbandry and dairy business-related aspects of the Maldhari people.

Introduction

India is home to a noticeable population of native breeds of milch animals including cattle and buffaloes. The livestock husbandry practices exist in the country from the ancient era and it has been well-documented in Indian folklores also [Rajput *et al.*, (2020); Bharwad *et al.*, (2016)]. Out of all states, Gujarat has a remarkable variety of native livestock breeds. The Gir, Kankrej and Dangi are the well-known breeds of cattle while Surti, Banni, Mehsani and Jafrabadi are well-known breeds of buffaloes in Gujarat [Rajput *et al.*, (2020); Bharwad *et al.*, (2016)]. The distribution of different breeds depends on geographic regions of the state, purpose of keeping livestock animals, interest of livestock owners and availability of breeding facilities.

On the other hand, successful animal husbandry and dairy business from such breeds depend on knowledge level of milch animal owners, socio-economic status, environment, management, animal genetics, adoption of husbandry practices, regular upgrading of knowledge, easy access to the findings of advanced research on improvised animal husbandry and dairy business practices, reduced laboratory research-farmers

gap, availability of extension media, awareness on existing healthcare practices as well as understanding and adoption of scientific animal husbandry practices.

Extensive surveys have been conducted on evaluation of knowledge level and adoption of dairy business practices and scientific animal husbandry practices in urban as well as rural areas of Gujarat; however, scientists may find it difficult to reach out to the milch animal farms or livestock owners residing in deeper areas in and around protected forest land in Gujarat. Moreover, such owners may or may not have keen interest on providing important information to the scientific community. In this regard, it is also brought to the notice of the scientific community that Maldhari people keep various types of milch animals and perform dairy business-related activities; however, their location and a habit of moving from one place to another place on frequent basis makes it difficult to approach them for conducting extension activities and surveys on regular basis. Emphasis has also been placed earlier on a need to assess existing knowledge level and adoption of different animal husbandry practices by these Maldhari people [Rajput *et al.,* (2020)].

The present paper highlights the findings of a retrospective survey conducted to assess knowledge level and adoption of dairy business practices by Maldharis of the Gir National Park & Sanctuary, Sasan Gir. Gujarat.

Materials and Methods

The present investigation is a retrospective analysis of a survey conducted by technical experts of Postgraduate Institute of Veterinary Education & Research (PGIVER), Kamdhenu University (KU), Rajpur (Nava), Himmatnagar and Directorate of Extension Education (DEE), KU, Gandhinagar at the Conservation Communication Centre (CCC) at Wildlife Division, Sasan Gir in collaboration with Deputy Conservator of Forests (DCF), Gir West Division during a "Holistic Animal Husbandry Extension Education Programme" organized for Maldharis residing in and around the Gir National Park & Sanctuary, Sasan Gir, Junagadh, Gujarat.

The training was organized, and survey was conducted during October 4th and 5th, 2017 where the Maldhari people residing inside nesses/small settlements/villages in and around the Gir National Park & Sanctuary was the main target population from two major divisions, *viz.*, Gir East and Gir West Divisions of Gir region, Gujarat [as defined by the Forest Department of Gujarat State]. The training programme included extension education on different aspects of scientific animal husbandry practices in 06 different sessions.

Survey and Data Analysis

The information pertaining to knowledge level and adoption of livestock management practices was collected by 'Direct Survey/Interview' approach and was recorded in a proforma (*i.e.*, a Semi-structured Survey Questionnaire). The questionnaire for assessment included questions specifically targeted towards basic animal husbandry practices, dairy business practices, disposal of carcass, training programme related questions and suggestions or opinions of respondents.

The training was attended by 400 participants [including 272 from 38 villages/nesses/ settlements from 08 ranges of the Gir West Division and 128 from 25 villages/nesses/ settlements from 05 ranges of the Gir East Division] out of which, the survey was carried out from 148 respondents [including 88 from Gir West Division and 60 from Gir East

Division]. The data analysis from the information collected during the technical programme was carried out on 'Percentage (%)' basis because this is the first survey which has been carried out for Maldharis of this region and no baseline information is evident in any scientific publication so far.

Results and Discussion

Gir west division

The results of survey from Maldharis of Gir West Division (n=88 respondents) pertaining to animal husbandry practices, milking and dairy practices and training programme related aspects are depicted in Table 1 and Table 2.

Out of 88 respondents from the Gir West Division, none of the Maldhari respondents said that they keep only one type of animal as livestock, practice tagging of their livestock, use injections to increase milk yield and perform incineration of carcasses of dead animals. On the other hand, all Maldhari respondents from this Division agreed or said 'Yes' when asked about keeping more than one type of animal as livestock, regular feeding of calf with colostrum, rearing of newborn calves at home, allowing livestock animals to graze in forest areas, use of milk at home and leaving livestock carcasses inside the forest areas. On training programme related aspects, all the respondents from Gir West Division agreed or said 'Yes' believing potential benefits may be associated from such training programmes, showed willingness to share knowledge gained through the training and agreed to organize and participate in such programmes on frequent basis (Table 2).

So far, such type of investigations has not been carried out previously for Maldharis of Gir West Division. The results of other questions varied remarkably amongst respondents from Gir West Division as shown in Table 1 and Table 2.

Gir east division

The results of survey from Maldharis of Gir East Division (n=60 respondents) pertaining to animal husbandry practices, milking and dairy practices and training programme related aspects are depicted in Table 3 and Table 4.

Out of 60 respondents from the Gir East Division, none of the Maldhari respondents said that they keep only one type of animal as livestock, practice tagging of their livestock, insure their livestock animals and use mineral mixture powder in diet of their livestock. On the other hand, all Maldhari respondents from this Division agreed or said 'Yes' when asked about keeping more than one type of animals as livestock, colostrum feeding to newborn calves on regular basis, allowing livestock animals to graze in forest lands, cleaning/washing of milking utensils before milking, use of milk at home, leaving carcasses of their dead animals inside forest areas and their animal getting injured or killed by lions in past. On training programme related aspects, all the respondents from Gir East Division agreed or said 'Yes' believing potential benefits may be associated from such training programmes, showed willingness to share knowledge gained through the training and agreed to organize and participate in such programmes on frequent basis which was found to have clear similarities with the respondents from Gir West Division (Table 2 and Table 4).

So far, such type of investigations has not been carried out previously for Maldharis of Gir East Division. The results of other questions varied remarkably amongst respondents from Gir East Division as shown in Table 3 and Table 4.

Overall results for Gir West & East Divisions

The overall results of the survey from Maldharis of Gir West and East Divisions (N=148 respondents) pertaining to animal husbandry practices, milking and dairy practices and training programme related aspects are depicted in Table 5 and Table 6.

Out of 148 respondents from both Divisions, none of the Maldhari respondents said that they keep only one type of animal as livestock and practice tagging of their livestock. On the other hand, all Maldhari respondents from both Divisions agreed or said 'Yes' when asked about keeping more than one type of animals as livestock, colostrum feeding to newborn calves on regular basis, allowing livestock animals to graze in forest lands, use of milk at home and leaving carcasses of their dead animals inside forest areas.

On training programme related aspects, all the respondents from both Divisions agreed or said 'Yes' believing potential benefits may be associated from such training programmes, showed willingness to share knowledge gained through the training and agreed to organize and participate in such programmes on frequent basis (Table 2, Table 4 and Table 6).

So far, such type of investigations has not been carried out previously for Maldharis of both Divisions. The overall results of other questions varied remarkably amongst respondents from both Divisions as shown in Table 5 and Table 6.

Overall, remarkable variations were observed amongst Maldharis of both divisions with regards to insurance of livestock animals, bathing practices, feeding colostrum to newborn calves, rearing of newborn calves at home, dehorning or disbudding practices, use of chopped fodder to feed their animals, use of commercial concentrate feed in diet of animals, cleaning or washing hands before milking, cleaning or washing of teats and udder of milch animals before milking, cleaning of milking utensils, removal of first few strips of milk, using milk at home, selling of milk to nearby village, selling of milk to co-operative dairy firms, belief and use of injections to increase milk production, use of animal waste or excreta, leaving carcasses of dead animals in forest areas, preferring burial or incineration for disposal of carcasses and observation on their livestock animals getting killed by big cats such as lions and leopards.

So far, extensive investigations have been carried out for assessment of knowledge of dairy farmers or livestock owners and adoption of animal husbandry and dairy business-related practices by them. Such investigations or surveys have not been conducted for Maldharis residing in nesses/small settlements/villages in and around the Gir National Park & Sanctuary, Gujarat and no such study have been published in form of scientific literature to the best of authors' knowledge [Rajput *et al.,* (2020)].

With regards to the extent of knowledge on scientific practices, Saha *et al.,* (2010) observed that major portion of the livestock farmers in their survey possessed very low level of knowledge on animal husbandry. Similarly, Gour *et al.,* (2016) reported that majority of the respondents of their study had very low level of knowledge while none of the respondents had high level of knowledge regarding management, breeding, feeding and healthcare practices.

Table.1 Survey pertaining to animal husbandry practices, milking and dairy practices in Gir West Division (n=88 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (n=88)	No. of respondents with disagreement as "No" (n=88)
01	Keeping one type of animal as livestock	00 (00.00%)	88 (100.00%)
02	Keeping more than one type of animal as livestock	88 (100.00%)	00 (00.00%)
03	Tagging of owned livestock	00 (00.00%)	88 (100.00%)
04	Insurance of owned livestock	02 (02.27%)	86 (97.73%)
05	Bathing of livestock inside home/ness	78 (88.64%)	10 (11.36%)
06	Bathing of livestock in nearby river/stream (inside the forest area)	87 (98.86%)	01 (01.14%)
07	Colostrum feeding to newborn calf regularly	88 (100.00%)	00 (00.00%)
08	Rearing newborn male calves at home	88 (100.00%)	00 (00.00%)
09	Dehorning or disbudding as a routine practice	01 (01.14%)	87 (98.86%)
10	Use of chopped fodder for livestock feeding	06 (06.82%)	82 (93.18%)
11	Allowing livestock animals to graze in forest areas	88 (100.00%)	00 (00.00%)
12	Use of commercial concentrate products in diet of livestock	77 (87.50%)	11 (12.50%)
13	Use of mineral mixture powder in diet of livestock	02 (02.27%)	86 (97.73%)
14	Cleaning/washing hands with disinfectants before milking	82 (93.18%)	06 (06.82%)
15	Cleaning/washing of teat and udder with disinfectants before milking	82 (93.18%)	06 (06.82%)
16	Cleaning/washing of milking utensils before milking	85 (96.59%)	03 (03.41%)
17	Throwing/removing first few/initial strips of milk n ground	23 (26.14%)	65 (73.86%)
18	Use of milk at home	88 (100.00%)	00 (00.00%)
19	Selling of milk to nearby village	54 (61.36%)	34 (38.64%)
20	Selling milk to co-operative dairy firms	48 (54.55%)	40 (45.45%)
21	Belief in use of injections to increase milk yield	01 (01.14%)	87 (98.86%)
22	Opinion on use of injections to increase milk yield	00 (00.00%)	88 (100.00%)
23	Use of animal excreta at home	51 (57.95%)	37 (42.05%)
24	Leaving livestock carcasses inside forest	88 (100.00%)	00 (00.00%)
25	Disposal of livestock carcasses by burial method	06 (06.82%)	82 (93.18%)
26	Disposal of livestock carcasses by incineration	00 (00.00%)	88 (100.00%)
27	Any livestock killed by lions in past	86 (97.73%)	02 (02.27%)
28	Any livestock killed by leopards in past	53 (60.23%)	35 (39.77%)

Table.2 Training programme related aspects - Gir West Division (n=88 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (n=88)	No. of respondents with disagreement as "No" (n=88)
01	Whether participated in such training programme at Sasan before	44 (50.00%)	44 (50.00%)
02	Whether participated in such training programme at home/locality/ness	43 (48.86%)	45 (51.14%)
03	Belief on benefiting from present training programme	88 (100.00%)	00 (00.00%)
04	Willingness to share knowledge gained through this programme	88 (100.00%)	00 (00.00%)
05	Agreement for organization of such programmes frequently	88 (100.00%)	00 (00.00%)

Table.3 Survey pertaining to animal husbandry practices, milking and dairy practices in Gir East Division (n=60 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (n=60)	No. of respondents with disagreement as "No" (n=60)
01	Keeping one type of animal as livestock	00 (00.00%)	60 (100.00%)
02	Keeping more than one type of animal as livestock	60 (100.00%)	00 (00.00%)
03	Tagging of owned livestock	00 (00.00%)	60 (100.00%)
04	Insurance of owned livestock	00 (00.00%)	60 (100.00%)
05	Bathing of livestock inside home/ness	54 (90.00%)	06 (10.00%)
06	Bathing of livestock in nearby river/stream (inside the forest area)	59 (98.33%)	01 (01.67%)
07	Colostrum feeding to newborn calf regularly	60 (100.00%)	00 (00.00%)
08	Rearing newborn male calves at home	23 (38.33%)	37 (61.67%)
09	Dehorning or disbudding as a routine practice	03 (05.00%)	57 (95.00%)
10	Use of chopped fodder for livestock feeding	26 (43.33%)	34 (56.67%)
11	Allowing livestock animals to graze in forest areas	60 (100.00%)	00 (00.00%)
12	Use of commercial concentrate products in diet of livestock	57 (95.00%)	03 (05.00%)
13	Use of mineral mixture powder in diet of livestock	00 (00.00%)	60 (100.00%)
14	Cleaning/washing hands with disinfectants before milking	56 (93.33%)	04 (06.67%)
15	Cleaning/washing of teat and udder with disinfectants before milking	56 (93.33%)	04 (06.67%)
16	Cleaning/washing of milking utensils before milking	60 (100.00%)	00 (00.00%)
17	Throwing/removing first few/initial strips of milk n ground	21 (35.00%)	39 (65.00%)

18	Use of milk at home	60 (100.00%)	00 (00.00%)
19	Selling of milk to nearby village	20 (33.33%)	40 (66.67%)
20	Selling milk to co-operative dairy firms	36 (60.00%)	24 (40.00%)
21	Belief in use of injections to increase milk yield	01 (01.67%)	59 (98.33%)
22	Opinion on use of injections to increase milk yield	01 (01.67%)	59 (98.33%)
23	Use of animal excreta at home	49 (81.67%)	11 (18.33%)
24	Leaving livestock carcasses inside forest	60 (100.00%)	00 (00.00%)
25	Disposal of livestock carcasses by burial method	10 (16.67%)	50 (83.33%)
26	Disposal of livestock carcasses by incineration	10 (16.67%)	50 (83.33%)
27	Any livestock killed by lions in past	60 (100.00%)	00 (00.00%)
28	Any livestock killed by leopards in past	25 (41.67%)	35 (58.33%)

Table.4 Training programme related aspects - Gir East Division (n=60 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (n=60)	No. of respondents with disagreement as "No" (n=60)
01	Whether participated in such training programme at Sasan before	04 (06.67%)	56 (93.33%)
02	Whether participated in such training programme at home/locality/ness	03 (05.00%)	57 (95.00%)
03	Belief on benefiting from present training programme	60 (100.00%)	00 (00.00%)
04	Willingness to share knowledge gained through this programme	60 (100.00%)	00 (00.00%)
05	Agreement for organization of such programmes frequently	60 (100.00%)	00 (00.00%)

Table.5 Overall results of survey pertaining to animal husbandry practices, milking and dairy practices (N=148 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (N=148)	No. of respondents with disagreement as "No" (N=148)
01	Keeping one type of animal as livestock	000 (00.00%)	148 (100.00%)
02	Keeping more than one type of animal as livestock	148 (100.00%)	000 (00.00%)
03	Tagging of owned livestock	000 (00.00%)	148 (100.00%)
04	Insurance of owned livestock	002 (01.35%)	146 (98.65%)
05	Bathing of livestock inside home/ness	132 (89.19%)	016 (10.81%)
06	Bathing of livestock in nearby river/stream (inside the forest area)	146 (98.65%)	002 (01.35%)
07	Colostrum feeding to newborn calf regularly	148 (100.00%)	000 (00.00%)
08	Rearing newborn male calves at home	111 (75.00%)	037 (25.00%)
09	Dehorning or disbudding as a routine practice	004 (02.70%)	144 (97.30%)

10	Use of chopped fodder for livestock feeding	032 (21.62%)	116 (78.37%)
11	Allowing livestock animals to graze in forest areas	148 (100.00%)	000 (00.00%)
12	Use of commercial concentrate products in diet of livestock	134 (90.54%)	014 (09.46%)
13	Use of mineral mixture powder in diet of livestock	002 (01.35%)	146 (98.65%)
14	Cleaning/washing hands with disinfectants before milking	138 (93.24%)	010 (06.76%)
15	Cleaning/washing of teat and udder with disinfectants before milking	138 (93.24%)	010 (06.76%)
16	Cleaning/washing of milking utensils before milking	145 (97.97%)	003 (02.03%)
17	Throwing/removing first few/initial strips of milk n ground	044 (29.73%)	104 (70.27%)
18	Use of milk at home	148 (100.00%)	000 (00.00%)
19	Selling of milk to nearby village	074 (50.00%)	074 (50.00%)
20	Selling milk to co-operative dairy firms	084 (56.76%)	064 (43.24%)
21	Belief in use of injections to increase milk yield	002 (01.35%)	146 (98.65%)
22	Opinion on use of injections to increase milk yield	001 (00.68%)	147 (99.32%)
23	Use of animal excreta at home	100 (67.57%)	048 (32.43%)
24	Leaving livestock carcasses inside forest	148 (100.00%)	000 (00.00%)
25	Disposal of livestock carcasses by burial method	016 (10.81%)	132 (89.19%)
26	Disposal of livestock carcasses by incineration	010 (06.76%)	138 (93.24%)
27	Any livestock killed by lions in past	146 (98.65%)	002 (01.35%)
28	Any livestock killed by leopards in past	078 (52.70%)	070 (47.30%)

Table.6 Overall results of survey on the training programme related aspects (N=148 respondents)

Sr. No.	Particular	No. of respondents with agreement as "Yes" (N=148)	No. of respondents with disagreement as "No" (N=148)
01	Whether participated in such training programme at Sasan before	48 (32.43%)	100 (67.57%)
02	Whether participated in such training programme at home/locality/ness	46 (31.08%)	102 (68.92%)
03	Belief on benefiting from present training programme	148 (100.00%)	00 (00.00%)
04	Willingness to share knowledge gained through this programme	148 (100.00%)	00 (00.00%)
05	Agreement for organization of such programmes frequently	148 (100.00%)	00 (00.00%)

Nutrition and feeding practices play a crucial role to avoid deficiency, metabolic and nutritional disorders in livestock animals. Livestock owners must possess basic knowledge on feeding practices. In the present survey, it was found that respondents from both the Divisions allowed their animals to graze in open forest areas and had little

knowledge regarding stall-feeding of animals. This could have been associated with economic status of respondents or with availability of fodder for stall-feeding. Moreover, the forest lands also provide vast area for grazing and have wide range of nutritious plants which could also benefit the respondents economically.

Regarding knowledge level on feeding, Mankar *et al.,* (2011) reported a greater number of respondents to have knowledge about quantity of green fodder for cattle, quantity to be fed to buffalo/cow during first four days after calving, feeding of pregnant animals and quantity of colostrum to be fed to newly born calves. Similarly, Solanki *et al.,* (2011) also found respondents with greater knowledge on requirement of extra ration for pregnant cows, extra ration for cow after calving, importance of green fodder and concentrate feed to increase milk production, importance of mineral mixture, two times feeding of ration to milking cow and chaffing of fodder. Moreover, Prajapati *et al.,* (2012) documented that nearly two-third of tribal dairy farm women surveyed in their study had medium level of knowledge regarding no-cost and low-cost technologies of feeding and watering. Kaur and Rathore (2014) observed medium level of knowledge on feeding practices amongst respondents of their study.

Regarding dairy management practices, Chandrakala (1999) reported that farm women laborers had high knowledge of improved dairy management practices in their study while Sharma *et al.,* (2009) found majority of respondents with moderate knowledge about buffalo husbandry management practices. On the other hand, Kumar and Prajapati (2011) observed a majority of women having enough knowledge about the use of dung as fuel while none of the respondents was found to have any knowledge on physiology of animals and their vaccination in their study. Kaur and Rathore (2014) have also reported maximum number of members possessing medium level of knowledge on animal husbandry practices.

With regards to knowledge on and adoption of practices for clean milk production, Saha *et al.,* (2010) observed equal portion of dairy farmer respondents having low and lower medium level of knowledge regarding clean milk production practices while Kaur and Rathore (2014) reported maximum respondents having medium level of knowledge on clean milk production practices. It has also been documented that marginal or commercial milch animal farm owners also face some constraints while practicing animal husbandry and dairy business [Bharwad *et al.,* (2016)].

The above-discussed findings of different scientific literature could have been based on surveys conducted in rural and urban areas where milch animal owners or livestock owners are approachable. The variations in knowledge-level pertaining to basic animal husbandry and dairy business practices found in the present study could have been associated with educational status of the respondents, socio-economic status, locality or area of survey, access to updated information on feeding practices, availability of improved rations having more nutritive values, individual interests, vision, individual interests, approach by scientific communities to conduct such surveys, and availability of extension or communication media.

In conclusion the present survey has provided useful baseline information on knowledge level of and adoption of basic animal husbandry as well as dairy business practices amongst Maldharis of the Gir West and Gir East Divisions in Gujarat. Findings of the survey will be helpful for veterinary fraternity and Forest Department of Gujarat to evaluate existing practices adopted by Maldharis residing in and around the Gir National Park

& Sanctuary, Gujarat. These findings will also help concerned authorities to develop and implement newer strategies for socio-economic upliftment of Maldharis of this region. Author encourage further continuation of similar extension studies in the said region in future.

Conflict of Interest & Acknowledgement

Authors declare no conflict of interest with regards to funding. Authors acknowledge support from Director of Extension Education (DEE) and ADEE, KU, Gandhinagar; staff of PGIVER, KU, Rajpur (Nava); other University authorities; authorities of the Forest Department of Gujarat state and all Maldhari respondents.

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How to cite this article:

Rajput, M.B., C.M. Bhadesiya, S.J. Vekariya and Patel, P.P. 2021. Knowledge Level and Adoption of Dairy Business-related Practices Amongst Maldharis in and around Gir National Park & Sanctuary. *Int.J.Curr.Microbiol.App.Sci.* 10(03): 1358-1368.
doi: https://doi.org/10.20546/ijcmas.2021.1003.166