RESEARCH ARTICLE Indian Journal of Animal Research, Volume 54 Issue 7: 905-911 (July 2020)

Management Practices for Rearing of Gangatiri Cattle in Native Tract

Puspendra Kumar Singh[1], G. Sankhala[1], P.K. Singh[2], Y.S. Jadoun[1]

10.18805/ijar.B-3845

ABSTRACT

The present study was purposively conducted in native tract of Gangatiri cattle in Uttar Pradesh. The information were collected from 108 respondents, who were rearing Gangatiri cattle for their livelihood. It was observed that most (53.70%) of the respondents practicing 6-10 hrs grazing of their Gangatiri herd. All the farmers were providing natural service to cows in estrus, maximum number of them (54.63%) between 12 to 16 hrs after detection of estrus and 53.70 per cent of them with bulls available in village surroundings. Maximum number of respondents (35.20%) initially used indigenous knowledge for disease treatment and after that consulted with veterinary doctor/ stockman. Major diseases prevelant in the area include FMD, HS, BQ and mastitis. Gangatiri cows were found to be more resistance to the diseases and heat tolerant as compared to crossbred cattle. Majority (81.48%) of respondents kept their cattle on kachcha floor in good sanitary conditions. About 70.37% respondents made cattle shed as a part of their houses. Majority (59.25%) of the cattle owners were using knuckling method of milking, which may be a cause of mastitis in animals. It can be concluded that there is need of awareness programmes on scientific cattle rearing practices and interventions like supply of semen of bulls of high genetic merit under AI programme or bulls of good genetic merit for natural breeding, adequate grazing land and inputs for health management practices are needed to make the Gangatiri cattle rearing more beneficial.

Key words: Breeding practices, Feeding practices, Gangatiri cattle, Health care practices, Housing, Management practices.

INTRODUCTION

Indian economy is predominantly rural economy with about 75.00% of its population residing in rural area. India ranks first in milk production which rose from 17 million tonnes in 1950-51 to around 176.3 million tonnes in 2017-18. Uttar Pradesh (19.56 million cattle) ranked 2nd for cattle population, while for milk production it stand first (29.5 million tonnes) during 2017-18 (BAHS, 2018). Gangatiri is a medium size, dual purpose cattle breed, distributed mainly in eastern Uttar Pradesh and generally reared by small, marginal farmers and landless labourer for their livelihood security (Anonymous, 2006). Indian Council of Agricultural Research has registered Gangatiri as a breed with accession number INDIA_CATTLE_2003_GANGATIRI_ 03039 in 2015. This cattle breed is well adapted to local agro- climatic conditions. Any intervention which can improve the productivity of these cattle will not only have far going effect on the sustainability of rearing these cattle but also have impact over the multidimensional empowerment of farmers. Such interventions cannot be drawn until we do not have information about their pattern of rearing in field condition. Therefore, keeping in view the above facts existing practices for rearing of Gangatiri cattle were studied.

MATERIALS AND METHODS

Exploratory research design was employed to provide answer to selected research question. The native tract of Gangatiri cattle covers Varanasi, Ghazipur, Ballia and Chandauli, districts of eastern Uttar Pradesh (Anonymous 2006). Two districts namely; Varanasi and Ghazipur were selected for the present study because these were having highest population of Gangatiri cattle. One block from each district, namely Arazilines from Varanasi and Mohammadabad from Ghazipur was selected randomly. From each selected block, three villages were selected by simple random sampling technique. A list of dairy farmers, who were rearing at least one Gangatiri cow with at least first lactation completed at the time of investigation, was prepared from each village. Dairy farmers were selected by proportionate random sampling method from the each village under different operational land holding category. Thus, a total of 108 dairy farmers were selected for study.

Data for different aspects of breeding, feeding, health and general management practices were collected on pre-designed questionnaire developed for this study. The data collected from both the districts were pooled and analyzed to reach on meaningful conclusions.

[1]ICAR-National Dairy Research Institute, Karnal-132 001, Haryana, India.
[2]ICAR-National Bureau of Animal Genetic Resources, Karnal-132 001, Haryana, India.

Corresponding Author: Y.S. Jadoun, ICAR-National Dairy Research Institute, Karnal-132 001, Haryana, India.
Email: ysvet1203@gmail.com

How to cite this article: Singh, P.K., Sankhala, G., Singh, P.K. and Jadoun, Y.S. (2020). Management Practices for Rearing of Gangatiri Cattle in Native Tract. Indian Journal of Animal Research. 54(7): 905-911.

Submitted: 20-05-2019 **Accepted**: 17-06-2019 **Published**: 09-11-2019

RESULTS AND DISCUSSION

Feeding Practices of Gangatiri cattle

Feeding is the most important factor in livestock farming. Until an animal is well fed, it can never performs with their full potential. Different aspects of feeding of Gangatiri cattle under study are shown in Table 1. Grazing was found to be main source of animal feeding. A total of 53.70% respondents were feeding their animals solely on grazing, whereas, 6.48% solely on stall feeding, however about 39.82% farmers opted grazing and stall feeding both as a source of feeding of their animals. Grazing is a practice of Gangatiri cattle rearing, which was followed from generation to generation in the locality. Grazing of cattle herd for 6-10 hrs/day was followed by majority (53.70%) of the respondents while 39.82% respondents practiced grazing of their animals for one to five hours. Besides grazing, 26.85% respondents provided paddy straw and wheat straw as dry fodder where as, 19.50% respondents provided only wheat straw as dry fodder to their animals. Findings of the study were in line with the findings of Malik *et al.* (2005), Singh *et al*. (2007b) who reported that, grazing was most prevalent practice adopted by cattle owners in rural area of Uttar Pradesh. Rathore *et al.* (2010a) and Akila and Senthilvel (2012) in their study in different part of India also observed that most of their respondents were practicing grazing of their livestock. About 46.36% respondents provided green grasses or leaves of fodder trees available in pasture land. Around 34.26% respondents provided with cultivated leguminous green.

Green fodder cultivation practices were adopted by very few farmers in the area under study and agricultural lands were mainly use for crop production. Rathore *et al. (*2010a) and Sabapara *et al.* (2010a) also observed similar pattern of fodder cultivation in other regions of India. Since, respondents had poor capacity of purchasing feeding materials, majority (68.51%) of the respondents were not feeding concentrate to their animals. Only 31.49% respondents provided concentrate to their animals. Home-made concentrate was provided by 21.31% respondents whereas, 10.18% respondents provided readymade concentrate to their animals, purchased from market.

As ingredients of concentrate, 31.49% respondents used oil cakes like mustard cake, linseed cake, groundnut cake, etc. and 24.10% respondents also provided mill byproducts like bran, *Chunni,* etc., whereas, 20.37%

Table 1: Feeding practices of Gangatiri cattle (N=108).

Practices	Frequency	Percentage (%)
Method of feeding		
Grazing	58	53.70
Stall feeding	7	06.48
Both	43	39.82
Duration of grazing (hrs/day)		
1-5 hrs	43	39.82
6-10 hrs	58	53.70
Dry fodder		
wheat straw	21	19.50
Paddy & wheat straw	29	26.85
Green fodder*		
Green grass	50	46.36
Fodder tree leaves	50	46.36
Leguminous green	37	34.26
Non leguminous green	37	34.26
Concentrate feeding		
No concentrate feeding	74	68.51
Concentrate feeding	34	31.49
a.Purchased concentrate feeding	11	10.18
b.Homemade concentrate feeding	23	21.31
Ingredients of concentrate*		
Grains and seed (Maize, Barley, Sorghum etc)	22	20.37
Mill byproduct (Bran, *Chunni*)	26	24.10
Oil cakes	34	31.49
Feeding of mineral mix.		
Yes	13	12.03
No	95	87.97
Dry fodder preservation	50	46.36
Feeding of pregnant animals with extra ration during advance stage of pregnancy.	25	23.15

respondents also provided grains and seeds like barley, *Jowar*, *Bajra*, Maize, etc. to their animals. Majority of respondents (87.97%) were not feeding mineral mixture to their animals. It was observed that respondents were not aware about benefits of feeding mineral mixture. Similar findings were also reported by Chowdhry *et al.* (2006), Madke *et al.* (2006), Kumar and Mishra (2011b) and Sheikh *et al.* (2011) in their studies in different part of India. It can be established from above facts that most of the respondents were adopting traditional feeding practices for their cattle. However, few respondents were practicing recommended feeding schedule, which depends upon their resource capacity and level of skill.

Breeding Practices of Gangatiri cattle

Different aspects of breeding practices have been summarized in Table 2. It reveals that, frequent bellowing of cows was the symptom used for detection of estrus by all the respondents whereas, other symptoms of estrus of cows *viz*. restlessness of cows, transparent vaginal discharge and mounting of cows on other cattle of the herd were used by 87.96, 87.04 and 84.25 per cent of respondents, respectively. Awareness about estrus symptoms was based on their experiences in cattle rearing and passed from generation to generation. Therefore, majority of farmers were known to different estrus symptoms. Patel *et al.* (2005) and Chowdhry *et al*. (2006) in their study also observed high awareness of the livestock keepers about different signs of estrus.

Natural service to the cows in estrus was performed by cent per cent respondents. For natural service, majority of respondents (53.70%) preferred bulls available in village locality followed by 39.80% respondents preferred government provided bulls and only 6.48% respondents practiced natural service of cows with stray bulls. Gangatiri bull semen was not available at A.I. centers but bulls were easily available in study area (Anonymous, 2013 and Singh *et al.*, 2007b). There is State Livestock Farm at Arazilines, Varanasi, where herd of good quality Gangatiri cattle was maintained. Respondents from nearby area preferred to natural breeding of their Gangatiri cows with bulls from the farm. Similar findings of preferred natural mating in other regions of India have also been reported by Rathore and

Table 2: Breeding Practices of Gangatiri cattle (N=108).

Practices	Frequency	Percentage (%)
Common signs of estrus detection in cattle*		
Restlessness	95	87.96
Bellowing	108	100.00
Mounting	91	84.25
Transparent vaginal discharge	94	87.04
Type of service		
Artificial insemination	-	-
Natural service	108	100.00
Both	-	-
Timing of service		
After 16 hrs	18	16.67
12 to 16 hrs	59	54.63
Up to 12 hrs	31	28.70
Pregnancy diagnosis		
With help of veterinarian /stockman	37	34.26
yourself	15	13.89
With help of other farmers	56	51.85
Criteria of pregnancy diagnosis by respondent*		
Non occurrence of estrus after 21 day of service	58	53.70
Style of walking of animal	37	34.25
Not allowing milking	13	12.05
Service period		
2-3 months	34	31.48
After 3 months	64	59.27
Less than 2 months	10	9.25
Natural service with		
Government provided bull	43	39.80
Village bull	58	53.70
Any stray bull	7	06.48

*Multiple responses.

Kachwaha (2009), Rathore *et al*. (2010a) and Kumar and Mishra 2011b.

Majority of respondents (54.63%) provided natural service to their cows between 12 to 16 hours after detection of estrus, while 28.70% respondents within 12 hrs and 16.67% respondents provided natural service after 16 hrs of detection of estrus. Majority of respondents (51.85%) preferred other experienced farmers in village for diagnosis of pregnancy in their cows. A little more than one third (34.26%) respondents preferred veterinarian/ stock man for pregnancy diagnosis. It may be due to negative attitude related with pregnancy diagnosis by physical handling of cows. Besides, there were many farmers in the area under study, who can predict pregnancy as well as time of pregnancy just by seeing the cow's gait and other symptoms on the basis of their experience. This may be possible reason for avoiding veterinary doctors or stockman for pregnancy diagnosis. Slightly more than half (53.70%) of the respondents considered non occurrence of estrus after 21 days of service as measure of diagnosis of pregnancy. About 34.25% respondents diagnosed pregnancy also by watching the style of walking of cows, while 12.05% respondents diagnosed pregnancy on the basis of fact that cows were not allowed milking. This knowledge was also related to their long experiences in cattle rearing. Less dependency of livestock farmers on veterinary doctors was also reported by Yadav *et al.* (2009) and Sabapara *et al.* (2010 b). After calving, next service of cows was provided after three months by majority (59.27%) of respondents followed by two to three months after calving by 31.48% respondents and within two months after calving by 9.25% respondents. The results have lineage with the findings of Yadav *et al.* (2009) and Sabapara *et al.* (2010b) but in contrast to Malik *et al.* (2005). It can be concluded that establishment of breeding infrastructure in the area of study and awareness about recommended breeding practices were required to Gangatiri cattle farmers.

Table 3: Diseases and reproductive disorders noticed in the year 2012.

Diseases	Frequency (No. of animal = (518)	Percentage
FMD	108	20.86
Bloat	69	13.41
Mastitis	59	11.36
Parasitic infestation	39	7.45
Retention of placenta	18	3.54
Repeat breeding	19	3.72
Post birth mortality	35	6.70
Abortion	11	2.05
Dystocia	13	2.42

Healthcare practices of Gangatiri cattle

Disease and reproductive disorders in Gangatiri cattle has been given in Table 3. During study a total of 518 animals were observed for one year health history, out of which 20.86% suffered with FMD, 13.41% with bloat and 11.36% with mastitis. The occurrence of other diseases was less than 10.00% in last one year. Gangatiri cattle are indigenous cattle and well acclimatized to the local climatic condition. These cattle had more resistance to the disease and parasites. FMD was endemic disease of the area. Most of the farmers practiced knuckling method of milking which causes damage to the teat which may be one of the causes of mastitis. Moreover, many farmers were having *kuccha* floor which may also increase the chances of infection to teats.

The health care management parameters are depicted in Table 4. When disease encountered in the herd, about 35.20% of respondents initially self medicated with indigenous materials and then consulted with veterinary doctors/ stockman. About one fourth (25.00%) of respondents consulted with veterinary doctors, 22.20% with local quacks, 9.10% with stockman and 8.50% respondents preferred complete self medication of sick animal with indigenous material. Knowledge about identification and use of medicinal plant for curing disease was transferred from generation to generation vertically and within society

Table 4: Healthcare practices followed by respondents for Gangatiri cattle (N=108).

Practices	Frequency	Percentage (%)
Consultation about encountered diseases*		
Government veterinarian	27	25.00
Initially self medication and later consultation with veterinary doctor/stockman	38	35.20
Local quack	24	22.20
Complete self medication with indigenous material	09	08.50
Stockman	10	09.10
Vaccination of cattle done*		
FMD	94	87.04
BQ	56	51.85
HS	60	55.56
Vaccination schedule followed	82	75.93
Vaccination only during sponsored programme	86	79.63
De-worming practices	92	85.18

*Multiple responses.

horizontally. In most of cases, it was effective and therefore, respondents prefer initially self medication with this indigenous knowledge for treatment of diseased cattle. Majority of the respondents (79.63%) vaccinated their herd only during sponsored vaccination programme organized by NGOs or State Animal Husbandry Department. Majority of the respondents (87.04%) vaccinated cattle herd for FMD, 55.56% for HS and 51.85% vaccinated their animals for BQ. Majority of the respondents (75.93%) followed the vaccination schedule. Pawar *et al.* (2006), Singh *et al.* (2007a), Gill and Saini (2008) and Varaprasad *et al.* (2013) in their study in different part of India reported that most of livestock farmers were practicing vaccination of their livestock. Most of the respondents (85.18%) practiced de-worming in their cattle herd. Malik *et al.(*2005) in Uttar Pradesh and Kumar and Mishra (2011a) in Uttarakhand, also reported that majority of livestock farmers were practicing de-worming of their livestock.

General management practices of Gangatiri cattle

General management practices followed in rearing of Gangatiri cattle are shown in Table 5. Majority of the respondents (70.37%) were having cattle shed as a part of

Table 5: General management practices followed by respondents keeping Gangatiri cows (N=108).

Practices	Frequency	Percentage (%)
Housing floor		
Kachcha floor in clean sanitary condition	88	81.48
Kachcha floor in non sanitary condition	5	04.63
Pucca floor	15	13.89
Source of water for animal*		
Village pond	71	65.74
Bore well/ hand pump	68	62.96
River / canal	54	50.00
Well water	11	10.19
No. of milking in a day		
Once	19	17.59
Twice	89	82.41
Method of milking		
Full hand	44	40.75
Knuckling	64	59.25
Type of milking vessel		
Aluminum	24	22.22
Iron	9	08.33
Stainless steel	75	69.45
Regular washing/cleaning of cattle shed and animals	82	75.92
Regular cleaning of milking utensils	108	100.00
If yes than how they clean the utensils*		
Water + Ash	55	50.93
Water + Detergent	53	49.07
After washing left the utensils in sun light	94	87.04
Location of cattle shed		
As a part of respondent house	76	70.37
Separate from respondent house	32	29.63
Removal of placenta		
By help of veterinarian	37	34.26
Natural shedding	71	65.74
Naval chord cutting	40	37.04
Colostrum feeding	108	100.00
Time of colostrums feeding		
Just after birth	44	40.74
Whenever newly born is able to stand on feet	38	35.19
After the placenta is shed	26	24.07
De-horning of calf	17	15.75
Castration of male calf done	86	79.63

* Multiple responses

their own house, while 29.63% respondents were keeping cattle in a separate shed. Kushwaha *et al.* (2007) surveyed livestock farmers of Uttar Pradesh and Madhya Pradesh and recorded that most of livestock farmers kept their bovine stock shed as part of their houses. Similar findings were also observed by Kumar and Mishra (2011b) in Uttarakhand. In majority of cattle sheds (81.48%) housing floor was *kuccha* and in clean sanitary conditions, while 13.89% respondents were having cattle shed with *pucca* floor and 4.63% respondents were having cattle shed with *ku*ccha floor and poor sanitary conditions. Bainwad *et al.*(2007), Singh *et al.* (2007b) and Ahirwar *et al.*(2009) also reported in Maharastra, Uttar Pradesh and Madhya Pradesh respectively that majority of the respondents kept their livestock in clean and *kaccha* livestock shed. Majority of the respondents (75.92%) were practiced regular cleaning of cattle shed and animals.

Village ponds and bore well/ hand pumps were used as main source for drinking water by majority (65.74 % and 62.96 %) of the respondents in study area. About half of the respondents were also using river water for drinking their cattle. In the age of bore well/ hand pumps, use of wells as source of drinking water was decreasing because it needs lot of physical efforts. However, 10.19% of respondents still using well as source of water for their cattle. It may be due to nearness of the well. Many respondents were implemented small jet pumps in the wells and draw water for house hold and cattle rearing purposes. The finding were in concordance with Deoras *et al.*(2004), Malik *et al.*(2005) and Singh *et al.*(2007a) who reported that village ponds and hand pumps were the main source of water for livestock in rural area.

Majority of respondents (82.41%) were milking their animals twice a day followed by 17.59% respondents who were milking once a day. Majority of respondents (59.25%) were used knuckling method of milking while 40.75% respondents were using full hand milking. Knuckling is not good practice and causes damage to teats. It might be reason of poor management practices for rearing of Gangatiri cattle and poor extension services in the study area. However, knuckling and twice a day milking was practiced by majority of the livestock farmers in other regions also as reported by Chowdhry *et al.*(2008), Rathore *et al.* (2010a) Kumar and Mishra (2011a). Majority of respondents (69.45%) used milk vessel made up of stainless steel, followed by 22.22% aluminum vessel and 8.33% milk vessel made up of iron. All the respondents practiced regular cleaning of milk vessel, 50.93% practiced cleaning utensils with water and ash followed by 49.07% respondents, who used water and detergent for the same. After washing, 87.04% respondents left the utensils in sun light. In this way they developed an alternative to the costly cleaning and disinfecting the milk utensils. Bainwad *et al.*(2007), Rathore and Kachwaha (2009), Kumar and Mishra (2011a) also observed that livestock farmers were practicing regular cleaning of their milking utensils. Majority of respondents (65.74%) preferred natural shedding of placenta, whereas 34.26% respondents preferred to call the veterinarian for the same. After parturition only 37.04% respondents practiced naval chord cutting. Naval chord cutting is a recommended practice but many of the livestock farmers from rural areas were still not adopting it. Similar pattern of practices were reported by Pawar *et al.*(2006) and Kushwaha *et al.*(2007) in other rural areas. All the respondents practiced colostrum feeding to newly born calf. About 40.74% respondents practiced colostrum feeding to calf just after birth followed by 35.19% respondents provided colostrum whenever calf became able to stand and 24.07% provided colostrums to calf after shedding of placenta off. Finding were in concordance with that of Malik *et al.* (2005), Divekar and Saiyed (2008), Rathore *et al.* (2010b) Kumar and Mishra (2011a) and Sheikh *et al.* (2011). Male Gangatiri cattle were fit for agricultural operations and rural transport, therefore, fetch privileged money on sale. The farmers were feeding colostrum after expulsion of placenta because they believed that feeding colostrum before expulsion of placenta might cause hindrance in expulsion. Majority of respondents (79.63%) practiced castration of male calf. Findings of study contradict to the findings of the Roy (2009), Rathore and Kachwaha (2009) and Kumar and Mishra (2011a), who reported that majority of livestock farmers were not practicing castration of male calves. Only 15.75% respondents practiced de-horning of calf. De-horning of calves is a recommended practices and not adopted by majority of rural livestock farmers as observed by Malik *et al.* (2005), Sabapara *et al.*(2010b) Kumar and Mishra (2011a). However, this is adopted mostly by livestock farmers who were involved in more intensive and commercial type of dairy farming as observed by Gupta *et al.*(2008) and Rathore *et al.*(2010b).

CONCLUSION

In nut shell, practices adopted for rearing of Gangatiri cattle reflect directly in form of their reproductive and productive performance. From this study, it can be concluded that most of the respondents follow traditional rearing practices, beside this respondents are facing problem of unavailability of germplasm, regularly shrinking and degraded grazing area. There is an intense need of awareness of these respondents about recommended cattle rearing practices. Besides, there is urgent need of making availability of elite Gangatiri germplam at A.I. centres as well as bulls of good genetic merit for natural breeding. Steps should also be taken for development and restoration of grazing area so that, cheap and nutritive greens may be made available to the Gangatiri cattle. Improvement of reproductive and productive performance of these cattle is not only necessary for their own sustenance but it will impact positively over the multi-dimensional empowerment of dairy farmers depends on *Gangatiri* cattle rearing for their livelihood security, there by increasing the farmers' income.

ACKNOWLEDGEMENT

The study was supported by ICAR- NDRI, Karnal under Division of Dairy Extension. The facilities provided by Director, ICAR- NDRI, Karnal are thankfully acknowledged. Much appreciation is extended to scientist and staff of Division of Dairy Extension, NDRI and to Gangatiri cattle owners that made this study possible.

REFERENCES

Anonymous. (2006). Cattle Genetic Resources of India GANGATIRI. Breed Monograph Pub. under Network Project on Animal Genetic Resources. ICAR, New Delhi, India.

Anonymous. (2013). Animal Husbandry Department, Government of Uttar Pradesh. Information available at website: http:// / http://animalhusb.up.nic.in/ (accessed-01/04/2013).

Ahiwar, R.R., Nanavati, S. and Nayak, N.K. (2009). Studies on housing management of buffaloes under rural and urban areas of Indore district of Madhya Pradesh. Indian J. Field Vet. 5(3): 41-43.

Akila, N. and Senthilvel, K. (2012). Status of dairy farming in Karur district of Tamil Nadu. Indian J. Anim. Res. 46(4): 401-403.

BAHS. (2018). Basic Animal Husbandry and Fisheries Statistics 2018. Published by Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi.

Bainwad, D.V., Deshmukh, B.R., Thombre, B.M. and Chauhan, D.S. (2007). Feeding and management practices adopted by buffalo farmers under watershed area. Indian J. Anim. Res. 41(1): 68-70.

Chowdhry, N.R., Patel, J.B. and Bhakat, M. (2006). An overview of feeding, breeding and housing practices of dairy animals under milk co- operative system in Banaskantha district of North Gujarat region. Dairy Planner. 5: 8-10.

Chowdhry, N.R, Patel, J.B. and Bhakat, M. (2008). A study of adoption of milking and healthcare practices of dairy animals under co-operative network of Banas milk union of North Gujarat. Indian J. Anim. Res. 42(2): 153-154.

Deoras, R., Nema, R.K., Tiwari, S.P. and Singh, M. (2004). Feeding and housing management practices of dairy animals in Rajnandgaon of Chhatisgarh plain. Indian Journal of Animal Sciences. 74(3): 303-306.

Divekar, B.S. and Saiyed, L.H. (2008). Feeding practices followed by professional cattle owners of Anand district. Indian J. Field Vet. 3(4): 31-34.

Gill, T.K. and Saini, S.K. (2008). A study of awareness of recommended dairy practices among farmers. Internat. J. Agric. Sci. 4 (1): 296-300.

Gupta, D.C., Suresh, A. and Mann, J.S. (2008). Management practices and productivity status of cattle and buffaloes in Rajasthan. Indian Journal of Animal Sciences. 78(7): 769-774.

Kumar, S. and Mishra, B.K. (2011a). Existing calf rearing and milking management practices followed by dairy farmers in Uttarakhand. Journal of Hill Agriculture. 2(1): 79-84.

Kumar, S. and Mishra, B.K. (2011b). Existing feeding and housing management practices followed by dairy producers in Tehri Garhwal district of Uttarakhand. Indian J. Anim. Prod. Mgmt. 27(3-4): 159-162.

Kushwaha, B.P., Kundu, S.S., Kumar, A., Maity, S.B. and Singh, S. (2007). Status of Bhadawari breed of buffalo in its breeding tract and its conservation. Indian Journal of Animal Sciences. 77(12): 1293-1297.

Madke, P.K., Murkute, J.S., Upadhye, S.V. and Vedpathak, C.P. (2006). Adoption of scientific feeding practices by dairy farmers. Indian J. Anim. Res. 40(2): 155-157.

Malik, B.S., Meena. B.S. and Rao, S.V.N. (2005). Study of existing dairy farming practices in Uttar Pradesh. J. Dairying Foods and Home Sci. 24(2): 91-95.

Patel, N.B., Patel, J.B., Prajapti, K.B. and Suthar, B.N. (2005). Breeding practices in dairy animals of rural area under Patan district of North Gujarat. National seminar on 'Recent advances in conservation of Biodiversity and augmentation of reproduction and production in farm animals' held 5-7 March, 2005 at Sardar Krushinagar Dantiwada Agricultural University, Sardar Krushinagar. 252.

Pawar, B.K., Nalawade, T.H. and Jagtap, D.Z. (2006). Adoption of bovine heeding practices and constraints faced by tribal farmers of Pune district. J. Maha. Agric. Univ. 31(3): 329-330.

Rathore, R.S. and Kachwaha, R.N. (2009). Studies on existing management practices followed by the buffalo owners in Jhunjhunu district of Rajasthan. Indian J. Anim. Prod. Mgmt. 25(1-2): 8-11.

Rathore, R.S, Singh, R., Kachwaha, R.N. and Kumar, R. (2010a). Existing management practices followed by the cattle keepers in Churu district of Rajasthan. Indian Journal of Animal Sciences. 80(8): 798-805.

Rathore, R.S., Singh, R. and Tiwari, A. (2010b). Studies on various existing managemental practices followed by the crossbred cattle owners. Indian J. Anim. Prod. Mgmt. 26(1-2): 85-88.

Roy, S. (2009). Knowledge level profile of farmers and their response towards livestock farming. National symposium on 'organic livestock farming- global issues, trends and challenges' held 26th-28th February, 2009 at Kolkata. ISAPM. pp-188.

Sabapara, G.P., Desai, P.M., Kharadi, V.B., Saiyed, L.H. and Singh, R.R. (2010a). Housing and feeding management practices of dairy animals in the tribal area of South Gujarat. Indian Journal of Animal Sciences. 80(10): 1022-1027.

Sabapara, G.P., Desai, P.M., Kharadi, V.B. and Singh, R.R. (2010b). Breeding and health care management status of dairy animals in the tribal area of south Gujarat. Indian Journal of Animal Sciences. 80(11): 1148-51.

Sheikh, A.S., Bhati, D.S. and Sheikh, W. (2011). Feeding practices followed by professional Kankrej cow owners of Banaskantha district of North Gujarat. Journal of Progressive Agriculture. 2(1): 67-69.

Singh, M., Chauhan, A., Chand, S. and Garg, M.K. (2007a). Studies on housing and health care management practices followed by the dairy owners. Indian J. Anim. Res. 41(2): 79-86.

Singh, P.K., Gaur, G.K., Pundir, R.K. and Singh, Avtar. (2007b). Characterization and evaluation of Ganagatiri cattle breed in its native tract. The Indian Journal of Animal Sciences. 77(1): 66-70.

Varaprasad, A.R., Raghunandan, T., Kumar, M.K. and Prakash, M.G. (2013). Management practices of the farmers rearing Jersey x Sahiwal cows in Chittoor district of Andhra Pradesh. Indian J. Anim. Prod. Mgmt. 29(1-2): 33-36.

Yadav, C.M., Bhimawat, B.S. and Khan, P.M. (2009). Existing breeding and healthcare practices of cattle in tribals of Dungarpur district of Rajasthan. Indian Res. J. Ext. Edu. 9: 36-38.