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Housing Management of Dairy Bovines : A Comparative Study in South and North Saurashtra Sub-Agroclimatic Zones of Gujarat

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ABSTRACT

Present study compared housing management practices (placement of shed, types of floor, wall, pillar, roof, manger and waterer, floor level from surrounding and slope, gutter, manure pit, feed store room, protection from cold stress, use of winter bedding and disinfectant) of dairy bovines in north (n=80) and south (n=80) Saurashtra sub-agroclimatic zones of Gujarat. In northern region, higher proportion of respondents had pucca floor (51.25 vs. 30%, P≤0.01) and wall (86.25 vs. 60%, P≤0.001) compared to southern region. Majority of farmers had RCC roof (52.5 vs. 20%, P≤0.001), but less had asbestos/tin roof (7.5 vs. 33.75%, P≤0.001) in southern than northern region. In northern region, 45% farmers provided pucca waterer; whereas, only 10% in southern region (P≤0.001). Floor level of shed above surrounding was higher in southern than northern region (50.0 vs. 17.5%, P≤0.001). However, majority of farmers in northern region constructed gutter as compared to southern region (48.75 vs. 32.50%, P≤0.05). Lower proportion of farmers in southern region had manure pit away from shed than that of northern region (54.84 vs. 84.75 %, P≤0.001). Higher percent of farmers in southern region disinfected floor compared to northern region (35 vs. 8.75%, P=0.006). In northern region, majority of farmers protected animals from cold stress than those in southern region (86.25 vs. 72.5%, P≤0.05). Present study indicated that certain housing management practices differed between two regions may be attributed to climatic difference including rainfall pattern.

Key words: *Housing, Dairy bovines, Saurashtra, Gujarat*

INTRODUCTION

Housing of dairy animals plays significant role in sustainable milk production by providing comfortable microclimate and hygienic environment[9]. Proper housing also helps in efficient utilisation of feeding materials by maintaining thermo-neutral zone of dairy animals[13], thus unnecessary wastage of feed energy can be avoided[10].

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Production potential of dairy animals although depends on the managemental factors, the later one markedly varies from one agroclimatic zone to another[2,3]. Housing also plays significant role in disease control and improves health and welfare of dairy animals[12]. Thus knowledge on existing management practices may help to identify strength and weakness of the dairy sector which could be further useful for formulation of proper intervention policies[2,11]. Saurashtra region of Gujarat is well known for the habitat of Gir cattle and Jaffrabadi buffaloes, widely known for their dairy potential, and contribute significantly to the milk pail of the state[5]. With this backdrop, present study was designed to document existing information on housing management practices followed by the dairy farmers in two sub-agroclimatic zones of Saurashtra.

MATERIAL AND METHODS

Present study was conducted at north and south Saurashtra sub-agroclimatic regions of Gujarat during 2013-14. North Saurashtra covers Jamnagar district, part of Rajkot, Surendranagar and Bhavnagar district; whereas, south Saurashtra covers Junagadh district and part of Bhavnagar, Amreli and Rajkot district. North and south Saurashtra receive on an average 400-700 and 625-750 mm rain fall and the climate is semi-arid and dry sub-humid, respectively[14].

In the present study, total of 160 respondents (80 respondents from each north and south Saurashtra sub-agroclimatic regions) were selected randomly. Information collected were related to placement of shed and types of building materials for floor, wall, pillar, roof, manger and waterer, as well as hygienic practices like floor level from surrounding, slope of standing platform, presence of gutter, location of manure pit, feed and fodder store room and disinfection practices. In addition, protection from cold stress and use of winter bedding related information were also collected.

Statistical analysis

Information collected were compiled, tabulated for frequency and for easy interpretation expressed as per cent. Housing management practices followed by the farmers between north and south Saurashtra sub-agroclimate were compared by chi-square test and the difference was considered as significant when $P \leq 0.05$. All the statistical analyses were carried out using SPSS software package (Version 16, USA).

RESULTS AND DISCUSSION

Information related to placement of shed and different types of materials used for the construction of building and other structures for dairy animals' shed are presented in table 1. Hygienic practices of shed and cold stress management for dairy animals practiced by dairy farmers are depicted in table 2.

Placement of shed

In Saurashtra region, majority of respondents (51.88%) kept their animals in sheds which were attached to human dwellings, but there was no variation between two sub-agroclimatic regions (48.75 and 55% in north and south Saurashtra, respectively) which is in accordance with Sabapara *et al*.[10], who observed 51% farmers had attached shed to human dwellings in south Gujarat. In a similar line, Mahendra *et al*.[4] in Rajasthan reported that in 45% cases animals' sheds were either attached or near to human dwelling. However, results of this study are contradictory to others in Gujarat[6,7,11] and other parts of India[8,13]. The variation in placement of animals' shed might be attributed to economic status of the farmers whether they could provide separate house for their animals or not[2]. Further, awareness of farmers about personal hygiene may be another reason which compelled them to construct animal shed away from the human dwelling. Construction cost of separate shed may be another reason for keeping animals near to human dwellings[7].

Types of floor, wall, pillar and roof

In northern region, higher proportion of respondents had pucca floor (51.25 vs. 30%, $P \leq 0.01$) and wall (86.25 vs. 60%, $P \leq 0.001$) than southern region with overall value 40.63 and 73.13%, respectively. The results are more or less comparable to others studies conducted in Gujarat[11] and other parts of India[8,13]. However, contrary to our results, 13 and 16% farmers in south[10] and north Gujarat[6] and very

few farmers in Rajasthan[2,4] had pucca floor. Moreover, Sinha *et al*.[13] in Uttar Pradesh observed in majority cases brick on edge floor and pucca wall. Majority of farmers had pucca or iron pillar (62.5%) in both regions and remaining had wooden pillars/ poles which are more or less comparable to Sabapara *et al*.[11] and Rao *et al*.[7] but contrary to Sabapara *et al*.[10]. Majority of farmers had RCC roof (52.5 vs. 20%, P≤0.001), but less had asbestos/tin roof (7.5 vs. 33.75%, P≤0.001) in southern region than those in northern region. Tile and thatched type roof was observed to be in 38.75 and 3.75% cases, but no difference was observed between the two regions. Sabapara *et al*.[10,11] in two districts (Surat and Navsari) of south Gujarat agroclimatic zone observed significant variation of roofing materials and same being observed in our study across two sub-agroclimatic regions. Variation of building materials among different agroclimatic zones has also been observed by Kalyankar *et al*.[3] in Maharashtra. Alteration of climatic variables particularly rainfall in different parts of India might be attributed to types of building materials used by the farmers.

Manger and Waterer

In the study area, about 63.75% farmers provided manger to their animals either permanent pucca or temporary type wooden or tyres as manger. In northern region, 45% farmers provided pucca waterer; whereas, only 10% in southern region (P≤0.001); but lower percent provided temporary waterer in northern as compared to southern region (55 vs. 90%, P≤0.001). The results are comparable with Sabapara *et al*.[11], who observed that 66% farmers in south Gujarat (Surat district) provided manger to animals. Contrary to our result, Sabapara *et al*.[10] cited less number of respondent who provided manger to their animals (36%) in Navsari district of south Gujarat. Further, in north[1,6] and south[7] Gujarat higher number of farmers (more than 3/4th of farmers) provided manger to the dairy animals. Provision of pucca manger (69.61%) in the study area is in consonance with Patel *et al*.[6] and Sabapara *et al*.[11] but contrary to Sabapara *et al*.[10] and Rao *et al*[7]. Previous studies in Gujarat as discussed above reported marked alteration of the types of manger provided for animals and same being observed in our study. In consonance with Rathore *et al*.[8], but contrary to Mahendra *et al*.[4], we observed fixed pucca type water trough in 28.13% cases. Variation of types of water trough observed in two different sub-agroclimates is in accordance with Sinha *et al*.[13], who observed in different areas of Bareilly district of Uttar Pradesh. Variation of existing climatic variables in two sub-agroclimatic zones or production system or availability of water source for animals may be the reason for provision of different types of feed manger and waterer.

Hygienic practices

Floor level of shed above surrounding was observed to be higher in southern than northern region (50.0 vs. 17.5%, P≤0.001) with overall value of 33.75%. Higher rainfall in southern region may be the reason that more number of farmers had animal shed's floor level above surrounding for proper drainage of water. About 47.5% cases, sloped floor was observed and there was a trend of sloped floor in southern region compared to northern region (55.0 vs. 40.0%, P=0.057). The results are more or less comparable with others studies[8,13] but contrary to Mahendra *et al*.[4] and Sabapara *et al*.[11], who observed presence of slope in 29.17 and 71.33% cases, respectively. On the other hand, majority of farmers in northern region constructed gutter as compared to southern region (48.75 vs. 32.50%, P≤0.05) with overall value 40.63% which are in accordance with Sabapara *et al*.[11]. The results are comparatively higher than the other studies in Gujarat[6,11] and other states of India[8,13]. However, Rao *et al*.[7] reported that 76.66% farmers constructed pucca urine drain inside shed for proper drainage and for keeping the floor clean and hygienic.

About 75.62% farmers constructed manure pit for disposal of solid waste with 69.42% had manure pit away from the shed. Lower proportion of farmers in southern region had manure pit away from shed as compared to northern region (54.84 vs. 84.75 %, P≤0.001). In a similar line, Sinha *et al*.[13] observed majority of farmers had manure pit at distant place (57.78-86.67%) in different regions of Bareilly district of Uttar Pradesh.

However, Sabapara *et al*.[11] reported 57.33% farmer in south Gujarat had manure pit at distant place. Very less number (21.88%) of farmers used phenyl to disinfect the floor of shed. Further, the value was significantly higher in southern than northern region (35 vs. 8.75%, P=0.006). This indicated that farmers were less aware about the cleanliness of the shed particularly in northern region. In a similar line, Sinha *et al*.[13] also observed that very few farmers disinfected floor of sheds (7.78-11.11). Majority of farmers keep dry fodder away from the animal shed (82.5%) may be to avoid fire hazard or to keep the shed clean and hygienic.

Cold stress management

In northern region, majority of farmers protected animals from cold stress than southern region (86.25 vs. 72.5%, P≤0.05) and overall value was 79.38%. The results are comparatively higher than the previous studies in south Gujarat[7,10,11]. Farmers generally used gunny bag or curtains to protect the animal from cold stress. In the study area, very less number of farmers (29.38%) without any regional difference used bedding materials during winter. Lower provision of winter beddings has also been reported by Sabapara *et al*.[11] and even Mahendra *et al*.[4] reported no provision of bedding. Moreover, others studies reported that majority of farmers (51.11-86.67%) offered winter beddings to animals[8,13]. The severity of winter stress in different regions may be the reason of disparity in provision of winter beddings to dairy animals.

Table 1: Placement of shed and types of building materials

Sr. No.	Particulars	N-S (n=80)	S-S (n=80)	Total (n=160)	χ^2 Value
1	Attached shed	48.75 (39)	55.00 (44)	51.88 (83)	0.63
2	Pucca floor	51.25 (41)	30.00 (24)	40.63 (65)	7.49**
3	Pucca wall	86.25 (69)	60.00 (48)	73.13 (117)	14.02***
4	Pucca pillar	62.50 (50)	62.50 (50)	62.50 (100)	0.00
5	RCC roof	20.00 (16)	52.50 (42)	36.25 (58)	18.28***
6	Tin/Asbestos roof	33.75 (27)	7.50 (6)	20.63 (33)	16.83***
7	Tile roof	42.50 (34)	35.00 (28)	38.75 (62)	0.95
8	Thatched roof	2.50 (2)	5.00 (4)	3.75 (6)	0.69
9	Presence of manger	65.00 (52)	62.50 (50)	63.75 (102)	0.19
10	Pucca manger#	75.00 (39)	64.00 (32)	69.61 (71)	1.46
11	Wooden/ tire manger#	28.85 (15)	36.00 (18)	32.35 (33)	0.59
12	Pucca waterer	45.00 (36)	10.00 (8)	28.13 (45)	24.58***
13	Temporary waterer	55.00 (44)	90.00 (72)	72.50 (116)	24.58***

N-S, North Saurashtra; S-S, South Saurashtra; # Sample size = 52, 50, 102 for N-S, S-S and total, respectively; ** $P \leq 0.01$, *** $P \leq 0.001$

Table 2: Hygienic practices of shed and cold stress management for animals

Sr. No.	Particulars	N-S (n=80)	S-S (n=80)	Total (n=160)	χ^2 Value
1	Floor level above surrounding	17.50 (14)	50.00 (40)	33.75 (54)	18.89***
2	Slope of floor	40.00 (32)	55.00 (44)	47.50 (76)	3.61†
3	Presence of gutter	48.75 (39)	32.50 (26)	40.63 (65)	4.38*
4	Presence of manure pit	73.75 (59)	77.50 (62)	75.625 (121)	0.30
5	Manure pit at distance place#	84.75 (50)	54.84 (34)	69.42 (84)	12.74***
6	Feed stored in separate place	77.50 (62)	87.50 (70)	82.50 (132)	2.77‡
7	Disinfection	8.75 (7)	35.00 (28)	21.88 (35)	16.13***
8	Protection from cold stress	86.25 (69)	72.50 (58)	79.38 (127)	4.62*
9	Winter bedding provision	28.75 (23)	30.00 (24)	29.38 (47)	0.03

N-S, North Saurashtra; S-S, South Saurashtra; # Sample size = 59, 62, 121 for N-S, S-S and total, respectively; † P=0.057, ‡ P=0.096, * $P \leq 0.05$, *** $P \leq 0.001$

CONCLUSION

In the present study, certain housing management practices for dairy animals differed markedly across the two sub-agroclimatic regions of Saurashtra. In northern region, significantly higher number of respondents had pucca floor and wall; whereas, lower number of farmers had RCC roof compared to southern region. Further, compared to southern region, higher proportion of farmers in northern region had tin/asbestos roof. Fixed type pucca waterer was provided by higher number of farmers in northern region than those in southern region. On the other hand, majority of farmers in southern region had floor level above the

surrounding and sloped floor. Farmers mostly constructed gutter inside the shed and manure pit at distant place away from animal shed in northern region as compared to southern region. Regarding disinfection of shed, more numbers of farmers were aware in southern regions. However, more number of farmers in northern region practiced ameliorative measures to protect their animals from cold stress. Geographical positioning and variation of climatic variables in the two sub-agroclimatic regions may be the reason for altered housing management practices across two sub-agroclimatic regions of Saurashtra.

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