



E-ISSN: 2320-7078

P-ISSN: 2349-6800

[www.entomoljournal.com](http://www.entomoljournal.com)

JEZS 2021; 9(1): 978-982

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Received: 07-11-2020

Accepted: 09-12-2020

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## Housing and shelter management practices followed by dairy owners of Western Maharashtra

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**Abstract**

The Present study was conducted in 4 districts of Western Maharashtra viz. Sangli, Satara, Solapur and Kolhapur. Data were collected from individual farmer on livestock health management. A total of 600 (150 from each district) livestock owners were selected. Out of that 492 and 108 were large animals and small ruminant's owners, respectively. At least one animal per farmer were randomly selected. Farmers were interviewed by a presented structured interview schedule. Two tahsil were selected and from each tahsil three villages were selected. Respondents (25 nos.) were selected randomly belonging to different categories of farmers. Majority of the respondents in Kolhapur (97.21%), Sangli (96.58%), Satara (91.60) and Solapur (56.00%) housed their animals separately away from their residence in tie stalls/conventional barns. Mostly farmers in Kolhapur and Sangli (>50%) follow north-south long axis orientation of the animal house. East-west long axis orientation was observed in >50% of animal houses in Solapur and Satara. They varied significantly between the districts. Majority of animals shed in Kolhapur (53.44%), Sangli (33.33%) and Satara (43.70%) had cemented floor. However, in Solapur area majority (52.22%) animal sheds were with *Kuccha*/mud floor (60.80%) followed brick floor and rest with cemented floor. The Chi square value indicated highly significant ( $p < 0.01$ ) difference in type of animal house floor between different districts. Half-walled animal shed was predominant in Kolhapur (59.54%) and Sangli (55.56%). Full wall was predominant in Satara (57.98%), but in Solapur, 60.00% animal houses were without any walls. Wall materials of animal houses varied in different districts. So, there is future scope for improving better management practices for gradation in dairy animal production Western Maharashtra.

**Keywords:** Roof material, orientation of house, roof material, feed manger

**Introduction**

Livestock husbandry is an important agriculture subsector of Indian economy. It significantly contributes to the agricultural GDP in India. It is the most important source of food security. It provides meat and milk and other dairy products, which enrich the nutrition intake. Clean and hygienic environment in animal house can influence the animal health, performance and can lead to optimize clean and healthy production (Madkar *et al.*, 2020, 2020A) <sup>[3, 4]</sup>. Tropical type of housing or confinement of livestock has important effects on production and reproduction (Sarwiyono *et al.*, 1993) <sup>[6]</sup>. Housing along with feeding management plays a very significant role in exploiting real potential of dairy animals (Sinha *et al.* 2009) <sup>[11]</sup> and both of them constitute about 75% of total cost incurred on milk production in dairy animals (Gangwar 1988) <sup>[14]</sup>. Better housing arrangements not only provide shelter but also keep the animals in comfortable zone especially during severe environmental conditions i.e. either extreme cold or hot when animals are most vulnerable to get afflicted with stress conditions. Housing and shelter buffer the extremes of climatic condition to lower stress on animal and provide protection from predators. Housing creates a microenvironment inside the animal house, which protects the animal from stressful environment and allows efficiency of proper labour utilization.

**Material and Method**

The present study was conducted in four districts of Western Maharashtra which include Sangli, Satara, Solapur and Kolhapur. Two tahsils were selected from each district and three villages were selected from each tahsil. From each village 25 respondents were selected randomly belong to different categories. A total 600 livestock's owners were selected and out of that 492 large animals owners and 108 small ruminants owners (150 from each district) having at least one milch cattle were selected randomly to study the housing management

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practices followed by them. Data pertaining to the study were thus collected.

## Result and Discussion

### Provision of housing of the dairy cattle/ type of house provided

Majority (96.58%) of the respondents in Sangli district housed their animals separately away from their residence in tie stalls/ conventional barns but individual housing was not practiced for different categories or breeds of dairy animals. Similar result was observed on separately kept dairy animals up to 89% (Sasane *et al.*, 2012) <sup>[7, 8]</sup> in Palus taluka of Sangli district.

In Satara, 91.60% farmers provided separate shelter/ housing to their dairy animals but 8% kept their dairy animals in a part or extension of their own residence better known as lean to type housing. In Solapur area, 56% of the livestock farmers arranged separate animal house and 33.60% kept their animals in a part or extension of their own residence. In Kolhapur area, 97.21% of the livestock farmers arranged separate animal house and 2.29% kept their animals in a part or extension of their own residence. Overall 85.47% of the total respondents studied from four districts of Maharashtra provided separate house to their dairy animals. The Chi square value indicates highly significant ( $p < 0.01$ ) difference w.r.t types of animal housing present in different district under the study.

North-south long axis orientation of the animal house (52.14%) in Sangli area was found and 47.86% animal houses had east-west orientation. North-south long axis orientation was observed in Satara (43.70%), Solapur (45.60%) and highest in Kolhapur area 62.60%. Overall 51.01% houses had north-south orientation and 48.99% having east-west orientation in Western Maharashtra. The Chi square value indicates highly significant ( $p < 0.01$ ) difference in the orientation of animal house between different districts. Orientation of animal house is considered important in relation to ventilation, entry of sunshine, animal house temperature management and others. Ideally the orientation of animal house should be in the north-south direction in temperate cold regions but east-west direction is best for all the sub-tropical districts. The difference from ideal may be due to lack of awareness and unavailability of proper land, as the priority is always with human dwelling first. The deviation from ideal orientation of animal house was not intentional rather coincidental and based on convenience.

Majority of the livestock owners in Kolhapur, Sangli and Satara provided a separate animal house, which is similar to the findings of (Rathore *et al.*, 2010). Animal houses were mostly separate in Kolhapur, Sangli and Satara probably for maintenance of health and hygiene of both human and animals. In Solapur, a considerable number of animal owners kept dairy animals in an attached part of their own residence (lean to type). (Sinha *et al.*, 2009b) <sup>[12]</sup> Reported that 63.33% dairy owners in rural area of Bareilly provided bovine shelter that was part of the residence of the owner. However, the percentage of farmers following the same varied in the present study from the mentioned researcher. Livestock owners often house their animals in lean to type houses to ensure a better observation and protection from theft and predators. It was probably also practiced as a measure to reduce the cost of constructing animal house and proper utilization of land.

### Animal housing materials

**Floor material:** In Sangli, 33.33% animal houses had cemented (38.46%) followed by bricked (18.80%) and *Kuccha* i.e. mud floor stone slabs or stone laid (9.40%), In Satara, 32.77% animal houses had bricked floor followed by 16.81% having *Kuccha* floor and 43.70% with cemented floor compare to 41.16 per cent farmers provided bricks with sand floors in their animal houses. (Kumar, *et al.*, 2017) <sup>[15]</sup>

Maximum (60.80%) animal houses had *Kuccha* flooring followed by stone slabs bricked (19.20%) and cemented (12.00%) in Solapur district but in Kolhapur animal houses had cemented (53.44%) floor followed by bricked (25.19%) and 19.85% *Kuccha* i.e. mud stone slabs or stone laid (1.53%), and which was better than all district may be due to well developed cooperative dairy channel. Overall most number of animal houses were found to have *Kuccha* floor (36.00%) followed by 17% having brick laid (brick on edge), 36.90% cemented and the rest 9.63% with stone slab floor were compared in UP state in Meerut district were 88.00 per cent farmers reared their animals on pucca house, 31.10 farmers kept their animals in open plus under shelter and closed house observed by a (Kumar *et al.*, 2017) <sup>[15]</sup> The Chi square value indicated highly significant ( $p < 0.01$ ) difference in type of animal house floor amongst different districts of Maharashtra under the present study.

Slope of floor is an important factor that is often instrumental in providing the drainage and cleanliness of animal house. In Sangli, 78.63% animal houses had slope towards the back of the house leading to easy drainage of urine and water, but 21.37% animal houses had no visible or considerable slope to facilitate such drainage. In Satara, 73.95% houses had slope towards back and 23.44% had no slope, In Solapur, only 54.40% animal houses had back slope followed by 41.60% with no slope and 4% with front slope and In Kolhapur district, animal houses had back slope followed by 86.26% with no slope 13%. Overall 73.31% animal houses of the respondents had back slope out of the total 492 observed animal houses.

Flooring has direct relation with the hygiene of cattle shed (Roy *et al.*, 2007) <sup>[5]</sup>. Majority of the animal houses in Solapur had *Kuccha* floor, may be due to low cost, easy availability and convenience of repairing. Second most observed floor type in animal houses was stone slab laid type, may be due to easy availability and durability. In Kolhapur, Sangli and Satara districts, majority of floors were cemented which is disagreement with (Singh *et al.* 2015) in Jharkhand where shed with Kachha floor and thatched roof is 75%. Cemented floor is generally durable and requires less repairing in comparison to *Kuccha* floor and that may be a reason for such finding in this area. In all these four districts under present study, cemented floor was more in number and this might be due to higher investment involved. Besides, it may be because it is convenient and easier to clean and do not require frequent repairing. Slope of animal house was mostly towards the back of animal shed to facilitate proper hygiene and drainage in the shed.

**Wall of the animal house:** In Sangli, 55.56% of the animal houses had half walls followed by 27.35% having full walls and 17.09% having no permanent wall but only roof. Animal houses in Satara (57.98%) were with full wall followed by half wall (22.69%) and without any wall of animal houses (19.33%). In Solapur, 60.00% animal houses were without any walls, 12% with full walls and 28.00% with half walls

(partial walls). Out of all the animal houses studied, in Kolhapur, 28.24% animal houses were with full wall, 12.21% without any wall followed by half wall (59.54%). Highly significant ( $p < 0.01$ ) differences in wall type of animal houses was observed.

Wall materials of animal houses varied in different districts. In Sangli district, Out of one hundreds and seventeen animal houses had wall (half/full) and 34.19% with concrete followed by 20.51% houses made of local materials including grass corn stovers, plants materials, and 13.25% with plastic and tin sheets, 9.64% were made of stone slabs cemented with mud or concrete and 9.40%, wooden planks or bamboo, etc. In Satara, house walls were made of 25.21% with concrete and the rest with plastic and tin sheets followed by 19.33% with local materials like jute stick, branches etc., 15.13% with wooden planks or bamboo and mud in 3.36%.

Out of 125 animal houses wall in Solapur, majority of local materials other than wooden planks/ bamboo (40.00%) were used followed by 13.60% animal house wall was made of concrete 9.60% had mud wall, wooden planks/ bamboo (11.20%), and only (4.80%) metallic and plastic sheets. In Kolhapur house of walls were made of 52.67% with concrete followed by 16.03% with local materials like jute stick, branches etc., mud in 1.53%, 9.92% with wooden planks or bamboo and the rest with plastic and tin sheets. Overall, 31.42% of the animal houses had walls made of cement and local materials 23.97% or in combination followed by 27.05% houses having walls made of mud, 17.68% had mud wall 3.62% with combinations and the remaining houses had metallic / plastic sheet, stone 14.38%.

Majority of the animal houses in Sangli had half walls followed by full wall which is in disagreement with the findings of (Roy and Nagpaul *et al.*, 2007) [5] who reported majority of cattle sheds to be with no walls, probably due to difference in place and periods of study. Sangli have medium average temperature round the year and that may be the reason that farmers here mostly constructed animal houses with half walls and full walls to prevent air draft and provide comfort to the animals. Farmers often curtain the open side/part of houses to prevent animals from air drafts. Most of the walls were made of cemented wall may be due to easy availability and durability.

In Satara district, the animal houses were with half walls followed by 22.69% with full walls that are in slight disagreement with findings of (Sinha *et al.*, 2009b) [12]. The present findings are similar to findings of (Swaroop and Prasad *et al.*, 2009) who stated that in Trans- Yamuna rural areas of Allahabad district famers housed their animals in *Kuccha* confined/ conventional house. The findings are in agreement with (Roy and Nagpaul *et al.*, 2007) [5] who reported that majority of cattle sheds did not have any walls in subsistence dairy farming.

**Roof material:** Varied types of roof materials were found to be used by dairy farmers for construction of animal house. Perusal of data showed that majority of respondents (50.43%) in Sangli area were using GI/ tin as roof material followed by 7.69% using polythene or plastic sheets, 18.80% local materials (other than thatch), thatch (7.69%), and asbestos (14.53%). In Satara district, majority (42.02%) of the houses were found with metallic sheets followed by local material (26.05%), asbestos (10.92%) and RCC (3.36%). In Solapur area, majority of the animal houses were with local materials (44.00%), followed by thatch roof (32.80%), metallic

sheet 12% 4.80% asbestos, earthen tiles (4%) Out of the total (492) studied animal houses in Maharashtra most common roof materials were tin (31.84%), local material 25.46%, thatch (14%) and asbestos (18.44%). Overall, metallic sheet roof installation was found in more no of animal houses followed by local material, asbestos thatch and earthen tiles. Predominance of using metallic sheets as roof material in Sangli and Kolhapur district may be the reason for such findings. The preference for metallic sheets (tin) was clear over other materials and the findings are in disagreement with (Roy and Nagpaul *et al.*, 2007) [5] and (Swaroop and Prasad *et al.*, 2009b). The preference for metallic sheet may be because it offers a long-term solution against heavy rainfall in the area and is durable. The average temperature round the year and using GI sheets/tin does not pose the threat of increasing heat load on animals. Polythene sheets and other materials were also used in the area. Polythene sheet installation was easy and involved less cost and the climatic condition in this area did not probably possess much problem to this type of installed roofs.

In Solapur district, more than half of the animal shed were installed with Local material as roofs followed by thatch, tin, asbestos and others. Earthen tiled roof was found in majority of the cattle houses that are in disagreement with (Roy and Nagpaul *et al.*, 2007) [5]. Thatched roof was second most preferred roof material. Earthen tiles were preferred over other materials probably due its properties like better heat insulation, fire proof, durability in comparison to thatch or other vegetative materials. Considerable number of thatched animals house were also found in this area, which have properties like thermal insulation, etc. but needed periodic installation and repair. Unlike Sangli and Kolhapur area, metal sheet/GI roofs were found very less in number in area, probably because of its inability to ward off heat load on animals especially during summer.

**Feed manger and water trough:** In majority of animal houses in Solapur district, conventional manger or water trough were not found for providing feed and water to the animals. Majority (81.60%) of the respondents used to feed fodder to their animals in a slightly raised platform (*Kuccha*) in front of the standing area of animal separated by bamboo or wooden polls to prevent soiling of fodder by the animal). The crude manger is located along one of the walls of the animal house preferably along the long axis of the animal house.

Most of the crude manger did not have any specific dimensions but 95% of such mangers were of optimum size for the animals housed in the shed considering 1.5 diameter from the front side as optimum for an animal. Only 13.60% of the animal house had provision of conventional type of feed manger either *Pucca* or wooden/bamboo or metal drum type (4.80%). Concentrate was fed to cattle individually in wide mouthed utensil/bucket. Water was provided *ad libitum* in bucket/ utensils.

In Satara, 59.66% of animal houses had *Pucca* or concrete mangers followed by 6.72% wooden/ bamboo or metal drum/utensils and 33.61% with *Kuccha* manger. In this area also provision of separate permanent water trough was found in majority (80%) of the houses the size of manger was optimum in 83.19% of the animal sheds. Generally, cattle were provided with water in buckets/ utensils. In Kolhapur majority (86.26%) of the animal houses had *Pucca* manger. followed by 3.05% with wooden/ bamboo or metal drum or utensils and 10.69% *Kuccha* manger. Overall, optimum

manger size was provided by 76.68% of the farmers in Western Maharashtra.

In Sangli, Satara and Kolhapur, majority of the feed mangers provided were of *Pucca* type that is in line with the findings of (Sinha *et al.*, 2009a) <sup>[11]</sup>. Feed mangers in Solapur were mostly of crude nature, may be because farmers did not felt need of conventional feed manger as here un-chaffed Jowar straw and grasses were mostly feed. Separately feeding of

concentrate was practiced in buckets/ utensils. *Pucca* feed manger was found in majority in other three districts, as it was considered more hygienic, easy to clean and durable by the farmers in these area. Majority of the households in all the districts have provided permanent water troughs expect Solapur areas that is in disagreement with (Garg *et al.*, 2005) <sup>[2]</sup>

**Table 1:** Housing and shelter management practices followed by dairy owners of Western Maharashtra

Housing management practices	Sangli n=117	Satara n=119	Solapur n=125	Kolhapur n=131	Avg.	( $\chi^2$ )			
<b>Type of animal house</b>									
Lean to type	4	3.42	10	8.40	42	33.60	3	2.29	11.93
Separate animal house	113	96.58	109	91.60	70	56.00	128	97.71	85.47
<b>Orientation of house</b>									
North-South	61	52.14	52	43.70	57	45.60	82	62.60	51.01
East-West	56	47.86	67	56.30	68	54.40	49	37.40	48.99
<b>Type of floor</b>									
<i>Kuccha</i>	39	33.33	39	32.77	76	60.80	26	19.85	36.69
Brick laid	22	18.80	20	16.81	10	8.00	33	25.19	17.20
Cemented	45	38.46	52	43.70	15	12.00	70	53.44	36.90
Stone slabs	11	9.40	10	8.40	24	19.20	2	1.53	9.63
<b>Slope of the floor</b>									
Towards front		0.00	3	2.52	5	4.00		0.00	1.63
Towards back	92	78.63	88	73.95	68	54.40	113	86.26	73.31
No slope	25	21.37	28	23.53	52	41.60	18	13.74	25.06
<b>Wall of the animal house/ shelter</b>									
Full	32	27.35	27	22.69	15	12.00	37	28.24	22.57
No wall	20	17.09	23	19.33	75	60.00	16	12.21	27.16
Half wall/ other	65	55.56	69	57.98	35	28.00	78	59.54	50.27
<b>Wall material</b>									
Wooden planks/ bamboo	11	9.40	18	15.13	14	11.20	13	9.92	11.41
Local materials other than (a)	24	20.51	23	19.33	50	40.00	21	16.03	23.97
Stone	14	11.97	27	22.69	26	20.80	20	15.27	17.68
Brick/ concrete	40	34.19	30	25.21	17	13.60	69	52.67	31.42
Metallic and Plastic sheets	28	23.93	17	14.29	6	4.80	19	14.50	14.38
Mud		0.00	4	3.36	12	9.60	2	1.53	3.62
<b>Roof material</b>									
Thatch	9	7.69	14	11.76	41	32.80	8	6.11	14.59
Local materials other than (a)	22	18.80	31	26.05	55	44.00	17	12.98	25.46
Metallic sheets/ Tin	59	50.43	50	42.02	15	12.00	30	22.90	31.84
RCC	2	1.71	4	3.36	0	0.00	5	3.82	2.22
Asbestos	17	14.53	13	10.92	6	4.80	57	43.51	18.44
Earthen tiles	0	0.00	2	1.68	5	4.00	3	2.29	1.99
Polythene sheets	9	7.69	5	4.20	3	2.40	11	8.40	5.67
<b>Feed manger</b>									
<i>Pucca</i>	78	66.67	71	59.66	17	13.60	113	86.26	56.55
<i>Kuccha</i>	33	28.21	40	33.61	102	81.60	14	10.69	38.53
Wooden/ bamboo or metal drum	6	5.13	8	6.72	6	4.80	4	3.05	4.93
<b>Size of the manger/ feeding space provided</b>									
Optimum	102	87.18	99	83.19	56	44.80	121	92.37	76.88
Not optimum	14	11.97	20	16.81	69	55.20	10	7.63	22.90
<b>Cleaning animal shed regularly</b>									
Yes	109	93.16	113	94.96	116	92.80	131	100.00	95.23
No	8	6.84	6	5.04	9	7.20	0	0.00	4.77
<b>Proper drainage system</b>									
Yes	52	44.44	47	39.50	25	20.00	75	57.25	40.30
No	65	55.56	72	60.50	100	80.00	55	41.98	59.51
<b>Location of manure pit</b>									
Adjacent	25	21.37	21	17.65	15	12.00	52	39.69	22.68
Distant	41	35.04	34	28.57	27	21.60	42	32.06	29.32
No provision of manure pit	51	43.59	64	53.78	83	66.40	36	27.48	47.81
<b>Floor space for cattle housed</b>									
Optimum	97	82.91	95	79.83	108	86.40	110	83.97	83.28
Not optimum	20	17.09	24	20.17	17	13.60	21	16.03	16.72

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Provision of bedding materials									
Yes	63	53.85	54	45.38	41	32.80	95	72.52	51.14
No	8	6.84	15	12.61	68	54.40	16	12.21	21.51
Only in winter	46	39.32	48	40.34	16	12.80	20	15.27	26.93

### Conclusion

As compared to others, the farmers of Kolhapur district adopted better scientific Housing management systems followed by Sangli, Satara and Solapur districts respectively. This study will provide important parameters to be considered to determine the housing system status of livestock which can be adopted as guidelines for scientific dairy management thereby increasing production and improvement of economic status of livestock owners.

### Acknowledgements

Authors are highly thankful to Director, IVRI for giving an opportunity to performed this work at filed area of western Maharashtra

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