



## Effect of floor types on the total viable count (TVC) in milk and health status of crossbred cows under field condition

A DEKA<sup>1</sup>, J HUSSAIN<sup>1</sup>, J SAHARIA<sup>1</sup>, K BORUAH<sup>2✉</sup>,  
 A HAQUE<sup>1</sup>, A PHOOKAN<sup>3</sup> and S TAMULI<sup>4</sup>

College of Veterinary Science, Assam Agricultural University, Assam 781022, India

Received: 29 May 2025; Accepted: 18 December 2025

**Keywords:** Floor, Foot and leg disorders, Mastitis, TVC

Dairying is inevitable for millions of rural and peri-urban people in India, as it serves as a major source of livelihood for them. The eastern and northeastern region of India lags behind in milk production since independence. The milk production of Assam is 1.0064 million tons only (BAHS 2023), which is less than 1.00 percent total milk national milk production. The dismal condition of the dairy sector in Assam is due to the lack of improved genetic resources (Mili and Dutta 2024), hot-humid climatic condition, and inadequate shelter management. The floor of a dairy shed affects the comfortability, health disorders, and milk quality. A comfortable and hygienic shed should be a priority area for clean milk production by any indigenous and crossbred milch cows (Singh *et al.* 2020a). Cows prefer soft surfaces for lying down, which is associated with decreased incidence of leg injuries in dairy cows (Tucker *et al.* 2003). Comfort in walking and lying of animals is associated with the flooring of the farm building (Singh *et al.* 2020b). Therefore, Optimum shelter management is important for dairy cows to obtain quality milk and to obtain a healthy replacement stock to sustain ductility. Hence, the present research encompasses microbial quality of milk and common health disorders in dairy cows under conventional housing system with concrete, bricked floor and wooden flooring.

The experiment was conducted for five months (January - May 2022) in private dairy farms located in Kamrup (Metro) district of Assam. All the farms had conventional animal shed. Total 15 dairy sheds were identified based on

their similarities in management and feeding practices. Out of these 15 shed, each five sheds were made up of concrete (G1), brick (G2) and wooden (G3) floors, respectively. Total 90 crossbred cows (6 in each shed x 15) were selected for the study, considering uniformity of their parity to estimate the total viable count (TVC) in milk. The milk sample from each shed was hygienically collected every fortnight to determine TVC as per Harrigan and McCance (1976). In addition to this, 120 crossbred cows reared under similar management practices were physically examined and recorded for foot and leg disorders, clinical mastitis, skin lesions, respiratory and alimentary tract disorders to appraise their clinical health status. The clinical mastitis was confirmed by California Mastitis Test (CMT). The statistical analysis of data was performed by using two-way ANOVA and the Chi-Square test (Snedecor and Cochran 1994) with the help of Ms Excel 2007.

The TVC was significantly ( $p < 0.05$ ) lowest in milk of cows reared on concrete floor (G1) followed by brick (G2)

Table 1. Average (Mean± SE) TVC (log cfu/ml) in milk of crossbred cows

Fortnights	Types of floor		
	G1	G2	G3
1 <sup>st</sup>	3.55±0.03 <sup>Aa</sup>	3.80±0.03 <sup>Ba</sup>	3.85±0.03 <sup>Ba</sup>
2 <sup>nd</sup>	3.45±0.16 <sup>Aa</sup>	3.77±0.17 <sup>Ba</sup>	3.88±0.02 <sup>Bab</sup>
3 <sup>rd</sup>	3.89±0.02 <sup>Aa</sup>	3.94±0.02 <sup>Ab</sup>	4.01±0.02 <sup>Aab</sup>
4 <sup>th</sup>	3.88±0.17 <sup>Aab</sup>	4.13±0.05 <sup>Bb</sup>	4.00±1.00 <sup>Bb</sup>
5 <sup>th</sup>	4.11±0.02 <sup>Aabc</sup>	4.14±0.05 <sup>Ab</sup>	4.36±0.08 <sup>Bc</sup>
6 <sup>th</sup>	4.00±0.03 <sup>Aab</sup>	4.30±0.04 <sup>Bbc</sup>	4.26±0.17 <sup>Bc</sup>
7 <sup>th</sup>	4.12±0.03 <sup>Abcd</sup>	4.40±0.03 <sup>Bc</sup>	4.55±0.05 <sup>Bd</sup>
8 <sup>th</sup>	4.28±0.18 <sup>Accl</sup>	4.55±0.02 <sup>Bd</sup>	4.72±0.04 <sup>Bd</sup>
9 <sup>th</sup>	4.31±0.16 <sup>Ade</sup>	4.63±0.03 <sup>Bd</sup>	4.97±0.05 <sup>Cc</sup>
10 <sup>th</sup>	4.39±0.02 <sup>Ac</sup>	4.76±0.02 <sup>Bd</sup>	5.08±0.03 <sup>Cc</sup>
Over all (μ)	3.99±0.04 <sup>A</sup>	4.24±0.05 <sup>B</sup>	4.37±0.07 <sup>C</sup>

Means with different superscripts within a row (capital letter) and column (small letter) differ significantly ( $P < 0.05$ ).

Present address: <sup>1</sup>Department of Livestock Production Management, College of Veterinary Science, Assam Agricultural University, Khanapara, Assam. <sup>2</sup> Corresponding author, Department of Livestock Production Management, Lakhimpur College of Veterinary Science, Assam Agricultural University, Joyhing, North Lakhimpur, Assam. <sup>3</sup>Department of Animal Genetics & Breeding, College of Veterinary Science, Assam Agricultural University, Khanapara, Assam. <sup>4</sup>Department of Veterinary Biochemistry, College of Veterinary Science, Assam Agricultural University, Khanapara, Assam. ✉Corresponding author email: kandarpalcvsc@gmail.com

Table 2. Percent (%) incidence of leg and foot disorders in crossbred cows

Floor	Affected	Not affected	Chi-square value
Concrete (G1)	57.33 (43)	42.67 (32)	6.609*
Brick (G2)	62.86 (44)	37.14 (26)	
Wooden (G3)	41.54 (27)	58.46 (38)	
Overall	54.29 (114)	45.71 (96)	

Figures within parenthesis are number of observation & \*Significant (p<0.05).

and wooden floor (G3). The average TVC (log cfu/ml) was recorded as 3.99±0.04, 4.24±0.05 and 4.37±0.07 in the milk of crossbred cows reared on concrete, brick and wooden floor, respectively (Table 1). The lowest value of TVC (log cfu/ml) on the concrete floor might be due to maintenance of clean udder and teats, attributable to better cleanliness and hygienic condition than the others. Again the result of the experiment showed that brick floor is more favourable as compared to wooden floor in context of maintaining microbial quality in milk. Earlier also, it was reported that milk from the cows kept in barns made from concrete floor had lower (p<0.001) total bacterial counts than the milk from the cows kept on floors made from timber and soil (Massawe *et al.* 2018). This differs from the bulk tank as the milk quality in bulk tank would depend as on the udder health and cleanliness. Elmoslemany *et al.* (2009) had also proved positive association of udder hygiene score and bacterial counts in milk. In addition to this, Jayarao *et al.* (2004) had reported that farm management practice and herd size also influenced the total bacterial count in milk of bulk tank. Therefore, concrete floor would be the better choice to rear the dairy cows even for the shed with thatched roof and wall constructed by local cheap materials.

Further may be observed from the Table 1 that TVC value increased significantly (p<0.05) from 1<sup>st</sup> to 10<sup>th</sup> fortnight in all the groups. This transition in milk quality might be due to seasonal variation from January to May, 2022 and / or stage of lactation.

The chi-square test (Table 2) revealed significantly (p<0.05) highest incidence of leg & foot disorders was observed in cows reared on brick floor (62.86 %) and



Fig. 1 Incidence of hoof elongation in a crossbred cows

Table 3. Distribution of leg and foot disorders in crossbred cows

Groups	Carpel Hygroma %	Hock swelling %	Hoof Elongation %	Sole ulcer and others %
G1	18.67 (14)	21.33 (16)	9.33 (7)	9.33 (7)
G2	21.43 (15)	24.29 (17)	41.43 (29)	21.43 (15)
G3	12.31 (8)	10.77 (7)	36.92 (24)	18.46 (12)
Overall	17.62 (37)	19.05 (40)	28.57 (60)	16.19 (34)
Chi-square value	2.020 <sup>NS</sup>	4.389 <sup>NS</sup>	21.493**	4.261 <sup>NS</sup>

Figures within parenthesis are number of observation, NSNon-significant (p>0.05), & \*\*Highly significant(p<0.01).

lowest incidence on wooden floor (41.54 %). The results of present study were very close to that reported by Islam *et al.* (2020).

Out of different disorders, incidence of hoof elongation (Fig. 1) was significantly altered (p<0.01) amongst the types of floor (Table 3). Both single type of foot & leg disorder as well as cows with combined disorders were observed amongst the cows. The elongation of hoof was maximum on the brick floor followed by the wooden floor which might be due to imbalance of body weight borne by the hooves placed on the respective floor surface in conventional shed. The present observation was in close proximity with the observations reported by Hussain (2002).

There was significantly high (74.29 %) incidence of skin lesions (p<0.01) in cows reared on brick floor, perhaps due to the hard and abrasive nature of the respective floor. Similar findings were also revealed by Dutta *et al.*2020, Islam *et al.*2020). The highest incidence of clinical mastitis was recorded on the wooden floor, followed by the brick floor, and the lowest on the concrete floor as expected from the TVC count; statistical analysis showed a significant difference (p<0.05) with respect to clinical mastitis in crossbred cows reared on different types of floor (Table 4). In the present study, the higher incidence of clinical

Table 4. Percent (%) incidence skin lesion and clinical mastitis in crossbred cows

Floor	% Affected	% Not affected	Chi-square value
Skin lesions			
Concrete (G1)	68.00 (51)	32.00 (24)	30.577**
Brick (G2)	74.29 (52)	25.71 (18)	
Wooden (G3)	30.77 (20)	69.45 (45)	
Overall	58.57 (123)	41.43 (87)	
Clinical mastitis			
Concrete (G1)	6.67 (5)	93.33 (70)	7.648*
Brick (G2)	10.00 (7)	90.00 (63)	
Wooden (G3)	21.54 (14)	78.46 (51)	
Overall	12.38 (26)	87.62 (184)	

Figures within parenthesis are number of observations, \*Significant (p<0.05) & \*\*Highly significant (p<0.01).

mastitis on the wooden floor might be attributed to its comparatively dirty nature and dampness. The incidence of respiratory disorders and alimentary tract disorders did not showed significant differences among the types of floor. Islam *et al.* (2020) had also reported that floor types had a significant effect on diarrhea ( $p < 0.05$ ) in cows kept on earthen and brick floors.

#### SUMMARY

This present study revealed that microbial quality of milk, in terms to total viable counts (TVC) was significantly poor in cows reared on wooden floor, the incidence of leg and foot disorders was significantly higher on brick floor and the incidence of clinical mastitis was recorded to be significantly maximum on the wooden floor. Out of various leg and foot disorders, significantly highest cases were those of elongation of hoof. It can be concluded that the concrete floor is more advantageous than the wooden and bricked floors in respect of milk quality. The prevailing foot and leg disorders and skin lesions observed on concrete floor under the present study may be additionally managed with the support of cow mat, pad etc.

#### ACKNOWLEDGEMENT

The authors express their sincere gratitude to Assam Agricultural University, Assam, India, for all the help and support in successful completion of the research work.

#### REFERENCES

- BAHS 2023. Basic Animal Husbandry Statistics-2023, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.
- Dutta C, Deka R J, Amonge T K, Sonowal M, Bhuyan M and Chutia J P. 2020. On farm welfare assessment of dairy cattle in small holders' production system in Assam. *International Journal of Chemical Studies* **8**(2): 851–57.
- Elmosleman A M, Keefe G P, Dohoo I R and Jayarao B M. 2009. Risk factors for bacteriological quality of bulk tank milk in Prince Edward Island Dairy Herds, Part 2: Bacteria count specific risk factors. *Journal of Dairy Science* **92**(6): 2644–52.
- Harrigan W F and McCance M E. 1976. Laboratory Methods in Food and Dairy Microbiology. Academic Press, London.
- Hussain J. 2002. Performance of Assam Local cattle and their crosses with Jersey and Holstein-Friesian. M.V.Sc. Thesis, Assam Agricultural University, Jorhat.
- Islam M A, Sharma A, Ahsan S, Mazumdar S, Rudra K C and Phillips C J. 2020. Welfare assessment of dairy cows in small farms in Bangladesh. *Animals* **10**(3): 394.
- Jayarao B M, Pillai S R, Sawant A A, Wolfgang D R and Hedge N V. 2004. Guidelines for monitoring bulk tank milk somatic cell and bacterial counts. *Journal of Dairy Science* **87**(10): 3561–73.
- Massawe H F, Mdegela R H and Kurwijila L R. 2018. Association of smallholder dairy farmers management and milking practices with bacterial quality of milk in Mbeya, Tanzania. *Animal Health and Production* **66**(1): 51–65.
- Mili B and Dutta H. 2024. Current scenario of milk production in the North-eastern states of India: Challenges and mitigation strategies to address milk shortfall. *Indian Journal of Animal Sciences* **94** (10): 896–900.
- Singh A K, Yadav D K, Bhatt N, Sriranga K R and Roy S. 2020a. Housing management for dairy animals under Indian tropical type of climatic conditions-A review. *Veterinary Research International* **8**(2): 94–99.
- Singh A K, Kumari T, Rajput M S, Baishya A, Bhatt N and Roy S. 2020b. A Review: Effect of bedding material on production, reproduction and health and behavior of dairy animals. *International Journal of Livestock Research* **10**(7): 11–20.
- Snedecor G W and Cochran W G. 1994. *Statistical Methods*, 8th edition. Iowa State University Press, Iowa.
- Tucker C B, Weary D M and Fraser D. 2003. Effects of three types of free-stall surfaces on preferences and stall usage by dairy cows. *Journal of Dairy Science* **86**(2): 521–29.