



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2026; 11(2): 287-291

© 2026 VET

www.veterinarypaper.com

Received: 10-12-2025

Accepted: 15-01-2026

Dr. DD Tekale

Research Engineer, ICAR-
AICRP on MAH, Vasantao
Naik Marathwada Krishi
Vidyapeeth, Parbhani,
Maharashtra, India

Dr. SS Deshmukh

Animal Scientist, ICAR-AICRP
on MAH, Vasantao Naik
Marathwada Krishi Vidyapeeth,
Parbhani, Maharashtra, India

AA Waghmare

SRA, ICAR-AICRP on MAH,
Vasantao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

PD Rathod

SRF, ICAR-AICRP on MAH,
Vasantao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

Corresponding Author:

Dr. DD Tekale

Research Engineer, ICAR-
AICRP on MAH, Vasantao
Naik Marathwada Krishi
Vidyapeeth, Parbhani,
Maharashtra, India

Design and development of cattle grooming unit for enhancement of hygiene, welfare and performance

DD Tekale, SS Deshmukh, AA Waghmare and PD Rathod

DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i2b.3028>

Abstract

Grooming of animals is an important managerial practice for the health of the herd. Feedback from small dairy owners, gaushala persons and field veterinarians indicates a need for low-cost mechanization in grooming. Grooming helps improve blood circulation, saves from blood protozoan diseases and helpful for clean milk production. Considering these facts grooming unit was designed with two grooming brushes of 375 mm X 600 mm (Dia. X Length) operated by 1hp electric motor which is assembled on MS pole of length 2125 mm which is fixed in RCC block. Grooming brushes are placed near two infrared proximity sensors which are controlled by VFD panel. It was observed that grooming unit shows comfort to the animal with improving physiological parameters and feed intake. The per cent dags and dirt reduce 55 and ectoparasites load reduces to 75% after grooming. It helps to maintain love and affection between the worker and the animal. Visually the skin color shows glossiness, indicating increased blood supply at body coat. No skin infection and blood protozoan diseases observed during the trial period. Use of grooming unit represents the cumulative positive impact on animal health.

Keywords: Grooming unit, monitoring, physiological parameters, and sensors

Introduction

Grooming is a natural and essential behaviour for cattle. According to reports, grooming behavior may have a connection to stress, health, and physiological status calving (Newby *et al*, 2013) [9]. Mechanical brushes used in free stall barns may enable cows to self-groom more body parts, hence decreasing boredom, tension, and dirt (Mandel *et al*, 2013) [10]. Inadequate grooming practices can lead to a host of health issues in cattle, with diseases such as mastitis, lameness, and various skin infections becoming prevalent. These conditions not only affect the health and productivity of the cattle but also increase veterinary costs and reduce the quality of milk. Effective grooming not only enhances the well-being and productivity of cattle but also plays a critical role in preventing disease spread, improving milk quality, and ensuring overall herd health. Regular grooming helps to detect early signs of health issues, allowing for timely intervention. Cattle groom naturally, and it seems to serve a number of significant purposes, such as maintaining the coat's hygienic condition (Rich, Kohari *et al.*, 2009) [4] and preserving social ties (Faerevik *et al.* Young calves can benefit from having access to a brush, and mechanical brushes give cows a way to indulge their natural grooming activity of scratching difficult-to-reach parts of their bodies (DeVries *et al.*, 2007) [6]. The main tool used by weaned heifers to groom their (2017) Rosenstein *et al.* Because of their rapid adoption and consistent usage by adult cows, brushes are advised for housing (Georg and Totschek, 2001; DeVries *et al.*, 2007) [8, 6].

Maintaining the animals' efficiency at the desired level, as well as the proper operation of their thermoregulatory systems and overall health, depends heavily on grooming. The head is groomed first, then the back and sides, and finally the tail's base. Cleaning, capillary stimulation, maintenance, and parasite control are further aspects of grooming. The goal of grooming is to get rid of skin and vestigial hair (Serap Goncu *et al.*, 2019) [2]. A developed grooming unit and conventional cow grooming methods took into consideration a number of parameters.

It is not always possible to effectively depict normal behavior in an artificial environment. Their welfare would be affected and they would become frustrated as a result. According to (Ninomiya S., 2014) ^[1], appropriate management of animal welfare (e.g. stressor, environmental enrichment) can mitigate several issues related to a harsh or poor habitat.

Review literature

Moran, J. (1993) ^[1] this research shows the highest groomed body area with 11% of grooming cows' necks, 3% of thighs and 86% of head. In addition, cattle use the brushes to soothe by scratching their neck and the ears' back, which are sensitive to touch by using the brush.

Emilie McConnachie *et al.*, (2018) in natural environments, cattle use trees and other abrasive surfaces to scratch and groom themselves. Modern indoor dairy cattle housing systems often lack appropriate grooming substrates, restricting the animals' ability to groom. We assessed the motivation of dairy cows to access an automated mechanical brush, a grooming resource that can be implemented in indoor cattle housing systems. Results indicate that cows are highly motivated to access a mechanical brush and that it is an important resource for cows.

Serap Goncu *et al.*, (2019) ^[2] mentioned some problems with technological grooming instruments. Cattle grooming removes dirt, dust, and parasites, improves blood circulation, and massages muscles. However, issues like unsuitable brush size or placement, operational malfunctions, and improper use may cause wounds, reducing benefits. Despite these challenges, research continues to develop more efficient grooming devices for cow comfort. Grooming is recognized as a welfare indicator, and integrating welfare instruments with modern technologies enhances animal wellbeing,

ultimately supporting productivity and profitability.

Shigeru Ninomiya (2019) investigated an effect of an animal self-grooming and welfare of fattening cattle. Results show that providing a brush as environmental enrichment improves welfare by satisfying the motivation of fattening cattle to perform self-grooming.

Kelebaone Tsamaase explained a dip spraying system which can be used to spray dip mixture on livestock such as cattle for control of parasites. The system is designed in such a way that it can be used at remote locations where there is no extension of national electricity grid. The results obtained show that the system is effective and can be installed at places without any access to electric grid. Effectiveness of the system is such showing that it can spray the whole body of the animal at once within a limited period of time.

Materials and Methods

The cattle grooming unit was designed and developed at ICAR-AICRP on MAH, VNМКV, Parbhani. The isometric view of the unit is shown in Fig. 1. The detailed design parameters are as follows:

Setup of grooming unit consists of

1. **Frame size:** Moving MS assembly frame size is 300 x 250 mm.
2. **Pole height:** Height of pole is 2125 mm of MS material.
3. **Grooming brush:** It consists of 2 brushes positioned in a horizontal and vertical (Making L-shape) having size 600 × 375 mm with thickness 2 mm.
4. **Sensor:** Infrared proximity sensors are used for detecting objects nearby.
5. **Electric motor:** 1 HP motor is used.

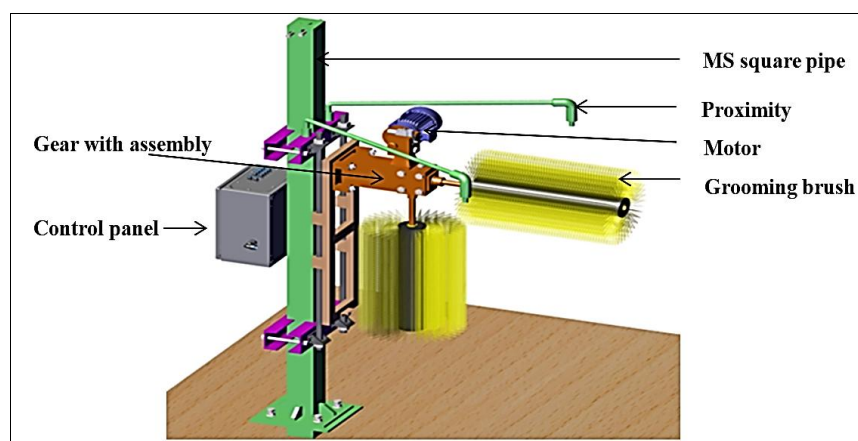


Fig 1: Isometric view of animal grooming unit

The grooming unit is equipped with two grooming brushes, each measuring 600 mm in length and 375 mm in diameter, designed to cover a significant area of the animal's coat during brushing. These brushes feature bristles 2 mm thick, which are optimal for efficiently removing dirt, dust, and parasites, promoting better skin health and overall well-being of the animals. Powered by a robust 1 HP motor, the grooming brushes operate at a controlled speed of 30 rpm, balancing effective cleaning with gentle handling to avoid stress on the animals.

To enhance operational efficiency and user convenience, the grooming unit incorporates an area-type proximity sensor, with a range of 1-3 meters, are placed near the brush and controlled by panel which ensures that the brushes operate

within the specified area, optimizing cleaning effectiveness while conserving energy and minimizing operational costs. This sensor technology contributes to the unit's reliability in maintaining consistent grooming standards across different animals and usage scenarios.

Overall, these design specifications reflect a commitment to enhancing animal welfare and productivity in agricultural practices. By integrating sturdy construction, precise dimensions, and advanced sensor technology, the grooming unit offers a reliable solution for maintaining cleanliness and health in cattle, supporting farmers in their efforts to optimize animal care and management. Brushes are kept in such a way as to apply the best pressure on the skin to stimulate blood circulation for best performance.

Data collection

Conducted trials in all summer, rainy and winter season as following treatments are done for observing changes in cattle before and after grooming some dependent parameters are considered for study as mentioned in table 1 and trials are taken on different bullock as shown in Fig. 2.



Fig 2: Trials conducted on different bullock

Treatments are as follows

- **T₀**: Manual twice grooming
- **T₁**: Twice grooming weekly by developed unit
- **T₂**: Alternate day grooming by developed unit
- **T₃**: Daily grooming by developed unit
- **T₄**: Twice a daily grooming by developed unit

Table 1: Observed machine parameters

Machine Parameters	
1. No. of brushes, orientation	2, Vertical+ Horizontal
2. Brush rotational speed, rpm	30
3. Brush dia., mm	150
4. Cycles per animal, RPM	45-55

3.3 Animal parameters considered for grooming unit

1. Dags and dirt, %
2. Ectoparasite load, %
3. Morbidity, %
4. Skin infection, %
5. Cleaning Efficiency, %
6. Fatigue score, 40 point scale

Animal parameters are calculated by following formulas

- 1) Percent Dags and Dirt (%) = $\left(\frac{\text{Initial Dust} - \text{Remaining Dust}}{\text{Initial Dust}} \right) \times 100$
- 2) Percent Ectoparasites (%) = $\left(\frac{\text{Initial Ectoparasites} - \text{Remaining Ectoparasites}}{\text{Initial Ectoparasites}} \right) \times 100$
- 3) Percent Morbidity (%) = $\left(\frac{\text{Number of sick Animals}}{\text{Total number of Animals}} \right) \times 100$
- 4) Percentage Reduction in time = $\left(\frac{\text{Traditional Time} - \text{Mechanized Time}}{\text{Traditional Time}} \right) \times 100$
- 5) Cleaning Efficiency = $\left(\frac{\text{Percent Before} - \text{Percent After}}{\text{Percent Before}} \right) \times 100$

Results and Discussion

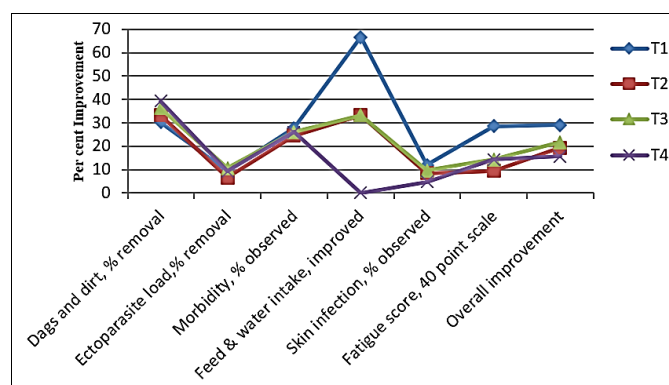
The physiological improvements are critical for maintaining optimal metabolic processes and overall health, which are essential for maximizing the productivity and efficiency of working animals. The reduction in stress and discomfort, as evidenced by the improved physiological parameters as shown in table 2, 4, 6, underscores the importance of regular and efficient grooming practices.

Table 2: Improvement in bullock by using developed grooming unit over traditional practices in summer season

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Dags and dirt,% removal	33	43	44	45	46
Ectoparasite load,% removal	75	82	80	83	82
Morbidity,% reduced	65	83	81	82	82
Feed & water intake,% improved	03	05	04	04	03
Skin infection,% reduced	83	93	90	91	87
Fatigue score,% reduced	21	27	23	24	24
Overall improvement	46.66	55.5	53.66	54.83	54

Table 3: Per cent improvement in bullock by using developed grooming unit over T₀ in summer season

Treatment	T ₁	T ₂	T ₃	T ₄
Dags and dirt,% removal	30.3	33.33	36.36	39.39
Ectoparasite load,% removal	09.33	06.66	10.66	09.33
Morbidity,% observed	27.69	24.61	26.15	26.15
Feed & water intake, improved	66.66	33.33	33.33	00.00
Skin infection,% observed	12.04	08.43	09.63	04.81
Fatigue score, 40 point scale	28.57	09.52	14.28	14.28
Overall improvement	29.09	19.31	21.73	15.66



Graph 1: Per cent improvement in bullock by using developed grooming unit over T₀ in summer season

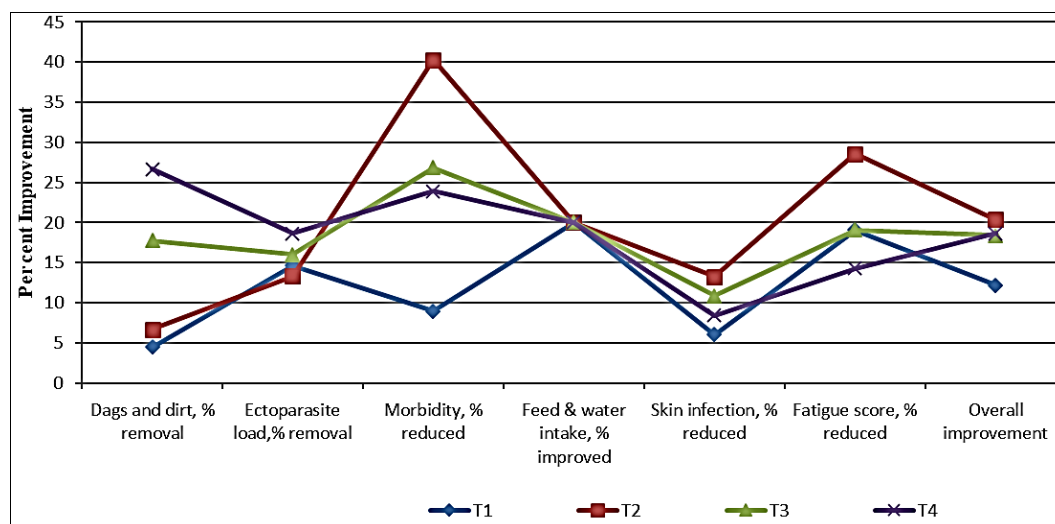
Table 3 and graph 1 shows that, as compared to the control, practice T₁ resulted in the greatest improvement in overall hygiene, minimum morbidity and was most effective in reducing skin infections and T₂ resulted in lower morbidity.

Table 4: Improvement in bullock by using developed grooming unit over traditional practices in Rainy season

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Dags and dirt,% removal	45	47	48	53	57
Ectoparasite load,% removal	75	86	85	87	89
Morbidity,% reduced	67	73	94	85	83
Feed & water intake,% improved	05	06	06	06	06
Skin infection,% reduced	83	88	94	92	90
Fatigue score,% reduced	21	25	27	25	24
Overall improvement	49.33	54	59	57.83	58

Table 5: Per cent improvement in bullock by using developed grooming unit over T₀ in rainy season

Treatment	T ₁	T ₂	T ₃	T ₄
Dags and dirt,% removal	04.44	06.66	17.77	26.66
Ectoparasite load,% removal	14.66	13.33	16.00	18.66
Morbidity,% reduced	08.95	40.29	26.86	23.88
Feed & water intake,% improved	20.00	20.00	20.00	20.00
Skin infection,% reduced	06.02	13.25	10.84	08.43
Fatigue score,% reduced	19.04	28.57	19.04	14.28
Overall improvement	12.18	20.35	18.41	18.65



Graph 2: Per cent improvement in bullock by using developed grooming unit over T₀ in rainy season

The treatments T₃ and T₄ produced superior ectoparasite reduction, whereas T₂ was more effective in reducing morbidity, skin infection and fatigue score. Table 5 and graph 2 shows the average of all parameters. T₂ provides the best

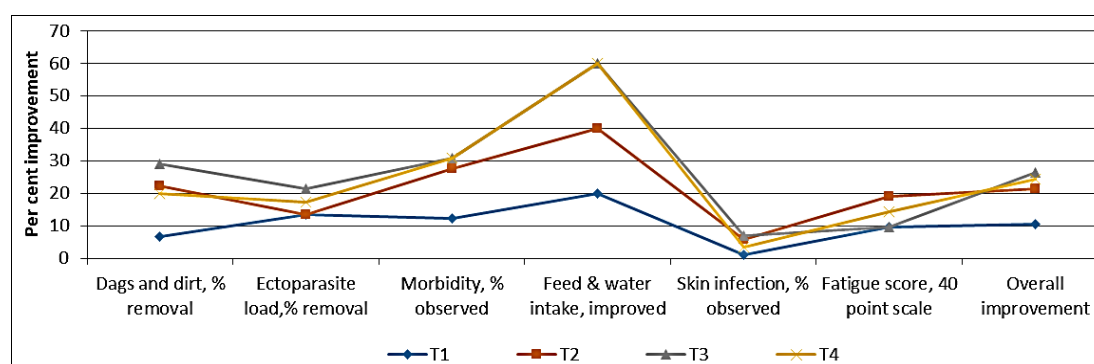
overall animal welfare response, indicating that moderate grooming intensity is more beneficial than either minimal or very high treatment levels for rainy season in bullock.

Table 6: Improvement in bullock by using developed grooming unit over traditional practices in winter season

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Dags and dirt, % removal	45	48	55	58	54
Ectoparasite load, % removal	75	85	85	91	88
Morbidity, % reduced	65	73	83	85	85
Feed & water intake, improved	05	06	07	08	08
Skin infection, % reduced	87	88	92	93	90
Fatigue score, 40 point scale, % reduced	21	23	25	23	24
Overall improvement	49.66	53.83	57.83	59.66	58.16

Table 7: Per cent improvement in bullock by using developed grooming unit over T₀ in winter season

Treatment	T ₁	T ₂	T ₃	T ₄
Dags and dirt, % removal	06.67	22.22	28.88	20.00
Ectoparasite load, % removal	13.33	13.33	21.33	17.33
Morbidity, % observed	12.30	27.69	30.76	30.76
Feed & water intake, improved	20.00	40.00	60.00	60.00
Skin infection, % observed	01.14	05.74	06.89	03.44
Fatigue score, 40 point scale	09.52	19.04	09.52	14.28
Overall improvement	10.49	21.33	26.23	24.30



Graph 3: Per cent improvement in bullock by using developed grooming unit over T₀ in winter season

Table 7 and graph 3 shows that treatment T₃ was found to be the most effective for winter season, as it achieved the highest removal of dags and dirt, maximum reduction in ectoparasite load, morbidity, and skin infections, along with the greatest improvement in fatigue score. Consequently, T₃ recorded the highest overall improvement

Time efficiency is significantly improved as well, the

developed unit, achieving between 76.67% and 88.33% time savings and enhances cleaning efficiency by up to 2.5 times for removing dags, dirt, and ectoparasites. This notable enhancement in hygiene reduces the risk of skin infections, ectoparasite infestations, and related health issues. Cleaner animals are less likely to suffer from infections, which translates to lower morbidity rates and better overall health.

Conclusion

The study is conducted for bullock for summer, rainy and winter season from this it is concluded that twice grooming weekly ($T_1 = 29.09\%$ improvement), is significant in summer season, alternate day grooming ($T_2 = 20.35\%$ improvement) for rainy season and daily grooming ($T_3 = 26.23\%$ improvement) for winter season are beneficial for bullocks. The result shows that improvements in animal health, hygiene, and productivity, combined with the economic benefits of reduced labor and time requirements, make a strong argument for adopting mechanized solutions in dairy farming and animal husbandry. Regular and efficient grooming not only enhances the welfare of the animals but also contributes to the sustainability and profitability of farming operations.

The transition from traditional practices to mechanized grooming represents a significant advancement in animal husbandry. The positive outcomes of this study provide a clear roadmap for farmers and agricultural practitioners looking to improve animal welfare and operational efficiency. As labor costs continue to rise and the demand for sustainable animal rearing grows, the adoption of mechanized solutions will play a vital role in shaping the future of animal husbandry. The benefits of mechanized grooming extend beyond immediate health improvements, fostering a more productive, sustainable, and economically viable livestock farming environment.

Acknowledgement

Authors are highly grateful to officials of All India Coordinated Research Project on Mechanization in Animal Husbandry funded by ICAR New Delhi for providing necessary facility to conduct this study.

Conflict of interest

Not available.

Financial support

Not available.

References

1. Moran J. Calf Rearing: A Guide to Rearing Calves in Australia. Victoria: Agmedia/Dept. of Agriculture; 1993.
2. Goncu S, Yesil MI, Yilmaz N. The Cattle Grooming Behavior and Some Problems with Technological Grooming Instruments for Cow Welfare. In: Aladjadjiyan A, editor. Animal Welfare. London: IntechOpen; 2019.
3. Rich GB. Grooming and yarding of spring-born calves prevent paralysis caused by the Rocky Mountain wood tick. *Can J Anim Sci.* 1973;53(2):377-378.
4. Kohari D, Sato S, Nakai Y. Does the maternal grooming of cattle clean bacteria from the coat of calves? *Behav Processes.* 2009;80(2):202-204.
5. Færevik G, Andersen IL, Jensen MB, Bøe KE. Increased group size reduces conflicts and strengthens the preference for familiar group mates after regrouping of weaned dairy calves (*Bos taurus*). *Appl Anim Behav Sci.* 2007;108(3-4):215-228.
6. DeVries TJ, Vankova M, Veira DM, von Keyserlingk MAG. Short communication: Usage of mechanical brushes by lactating dairy cows. *J Dairy Sci.* 2007;90(5):2241-2245.
7. Toaff-Rosenstein RL, Velez M, Tucker CB. Technical note: Use of an automated grooming brush by heifers and potential for radiofrequency identification-based

measurements of this behavior. *J Dairy Sci.* 2017;100(10):8430-8437.

8. Georg H, Totschek K. Investigation of an automatic brush for dairy cows. *Cattle Prod.* 2001;56:260-261.
9. Newby NC, Duffield TF, Pearl DL, Leslie KE, Leblanc SJ, von Keyserlingk MAG. Use of a mechanical brush by Holstein dairy cattle around parturition. *J Dairy Sci.* 2013;96(4):2339-2344. DOI: 10.3168/jds.2012-6016.
10. Mandel R, Whay HR, Nicol CJ, Klement E. The effect of food location, heat load, and intrusive medical procedures on brushing activity in dairy cows. *J Dairy Sci.* 2013;96(10):6506-6513.
11. Ninomiya S. Satisfaction of farm animal behavioral needs in behaviorally restricted systems: Reducing stressors and environmental enrichment. *Anim Sci J.* 2014;85(6):634-638.

How to Cite This Article

Tekale DD, Deshmukh SS, Waghmare AA, Rathod PD. Design and development of cattle grooming unit for enhancement of hygiene, welfare and performance. *International Journal of Veterinary Sciences and Animal Husbandry.* 2026;11(2):287-291.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.