The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 4, Issue 1, 2026

EFFECTS OF DIFFERENT BEDDING MATERIALS ON GROWTH PERFORMANCE, BEHAVIOR, AND HEALTH STATUS OF RED SINDHI CATTLE CALVES

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DOI: https://doi.org/10.5281/zenodo.18477176

Keywords
Bedding Materials, Growth Performance, Health Status, Red Sindhi Cattle

Article History
Received: 06 December 2025
Accepted: 16 January 2026
Published: 31 January 2026

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Abstract

This study evaluated the effects of different bedding materials on growth performance, behavior, and health of Red Sindhi cattle calves. Twelve calves were divided into three groups (A: katcha floor; B: wheat straw; C: rice straw) under an intensive management system. Group C (rice straw) showed significantly higher fortnightly body weight in Group C (134.375 kg) compared to Group B (129 kg) and Group A (118.25 kg). Similarly, Group C exhibited superior physical development, with the greatest fortnightly body height (118 cm), length (119.625 cm), and girth (130.75 cm), outperforming Group B (height: 113.125 cm; length: 117.125 cm; girth: 126 cm) and Group A (height: 108.5 cm; length: 110.25 cm; girth: 122.375 cm). Behavioural observations revealed Group C spent more time lying (208.375 minutes/day), feeding (28 minutes/day), and drinking (18.25 minutes/day), whereas Group A recorded the highest standing duration (141.500 minutes/day). In contrast, Group C displayed the lowest standing time (126.5 minutes/day). Feeding and drinking durations in Group B (25.5 and 16.375 minutes/day, respectively) and Group A (22.5 and 15.25 minutes/day) were notably lower. Health assessments identified lameness, swollen legs, and skin lesions exclusively in Group A, with no such issues observed in Groups B or C. These findings underscore the welfare advantages of bedding materials.it is concluded that rice straw bedding (Group C) significantly enhances growth performance, behavior, and health status in Red Sindhi cattle calves compared to wheat straw bedding (Group B) and the katcha floor (Group A). These results underscore the importance of appropriate bedding materials in improving calf welfare and productivity.

INTRODUCTION

The influence of bedding materials on dairy cattle performance, behavior, and health remains a critical area of research, particularly as sustainable farming practices gain prominence (Cantor et al., 2021). Bedding materials are essential for providing thermal insulation,

comfort, and hygiene, thereby directly impacting animal welfare and productivity (Chen et al., 2020; Leso et al., 2020). For instance, moisture-retentive bedding reduces bacterial proliferation and maintains a dry environment, which is vital for preventing dermatological and respiratory disorders in calves (Hötzel et al., 2019; Virkler et al., 2020).

Enhancing dairy cattle productivity aligns with global efforts to improve animal welfare while addressing environmental sustainability (Bruijnis et al., 2023). Optimized bedding systems not only reduce reliance on antimicrobial treatments but also mitigate greenhouse gas emissions associated with livestock waste (Huerth et al., 2022). Recent studies emphasize that improved management practices, including bedding selection, can extend the productive lifespan of dairy cattle by reducing stress-related pathologies (Adcock & Tucker, 2021; Pempek et al., 2022).

The behavioral and physiological responses of calves to bedding materials are well-documented. Hard surfaces, such as concrete, disrupt natural lying postures and circadian rhythms, whereas soft bedding (e.g., straw) promotes longer resting periods and better growth rates (Beaver et al., 2022; Medrano-Galarza et al., 2020). Poor-quality bedding exacerbates heat stress in calves, particularly in tropical climates, by limiting thermoregulatory behaviors such as nestling (Tresoldi et al., 2023). Contaminants like *Escherichia coli* are more prevalent in organic bedding (rice husk, straw) than in inorganic alternatives (sand, rubber mats), posing risks to calf health (Liang et al., 2021).

The calving period, a critical phase influencing lactation and reproductive efficiency, demands optimal housing conditions to minimize stress (Krpálková et al., 2022). Flooring and bedding systems must balance traction and comfort to prevent injuries and lameness (Gomez et al., 2023). Recent advancements in rubberized flooring and compost-bedded pack systems have shown promise in enhancing calf welfare (Pereira et al., 2020; Leso et al., 2023).

Bedding efficacy depends on moisture absorption, particle size, and caking resistance (Hötzel et al., 2021). Dairy cows exhibit a strong preference for deep-bedded stalls, which correlate with reduced lameness and higher milk yields (Westin et al., 2019; Virkler et al., 2021). Straw bedding, in particular, supports rapid eye movement (REM) sleep in calves, which is linked to improved cognitive development and growth (Whalin et al., 2021).

Thermoregulation is another critical factor: dry straw bedding lowers the critical temperature for calves from 18°C (concrete floors) to 6°C, reducing energy expenditure on maintaining body heat (Tresoldi et al., 2020). Damp bedding compromises this insulation, increasing susceptibility to hypothermia (Lago et al., 2023). Access to shade and ventilation is equally vital for mitigating heat stress in calves reared in arid or humid climates (Chen et al., 2022).

Modern housing systems prioritize organic bedding alternatives (e.g., recycled manure solids, miscanthus grass) due to their sustainability and cost-effectiveness (Huerth et al., 2023). However, inorganic materials like sand remain popular for their durability and ease of sanitation (Pempek et al., 2021). Recent trends also highlight the integration of sensor technologies to monitor bedding moisture and microbial load in real time (Klaas et al., 2022).

Materials and Methods

The study was conducted at the Livestock Experimental Station, Department of Livestock Management, Faculty of Animal Husbandry and Veterinary Science, Sindh Agriculture University, Tandojam. The experiment lasted for three months, from December 2023 to March 2024. Prior to the study, a 15-day adaptation period was provided to the experimental animals, during which they were drenched, tagged, and vaccinated.

Experimental Design and Animal Management

A total of 12 Red Sindhi cattle calves were randomly selected and allocated into three experimental groups (Group A, Group B, and Group C), each consisting of four calves. The objective was to evaluate the effect of different bedding materials on the growth performance, behavior, and health status of the calves. Two

types of bedding materials, wheat straw and rice straw, were tested on a katcha (earthen) floor, while calves in the control group (Group A) were housed on a katcha floor without any bedding. The experimental design is presented in Table 1

Table 1 Experimental Design

Bedding material	Group	No, of Calves	Feeding	Housing management system
Katcha floor (control group)	A	4	Green fodder + concentrate	Stall feeding
Wheat straw	B	4	Green fodder + concentrate	Stall feeding
Rice straw	C	4	Green fodder+ concentrate	Stall feeding

The floor was cleaned twice daily, and bedding materials were replaced every two weeks or as required based on their condition. Damp straw was replaced with dry straw to maintain a clean and dry bedding environment. Used straw was sun-dried outdoors before reuse.

Data Collection

Data collection for the study was systematically conducted across four key parameters: growth performance, body conformation, behavioral patterns, and health status. For growth performance, the initial body weight of each calf was measured at the study's commencement using an automatic weighing balance. Fortnightly weight gain was calculated based on incremental body weight measurements, with the final live body weight recorded at the study's conclusion. Body conformation parameters, including height, length, and girth, were assessed every two weeks using a measuring tape. Body height was measured vertically from the toe to the shoulder, body length horizontally from the shoulder to the pin bone (os coxae), and heart girth circumferentially around the chest. Behavioral assessments were carried out daily through direct observation between 08:00 AM and 03:00 PM, focusing on durations of lying, standing, feeding, and drinking. These observations were compiled and analyzed fortnightly over the three-month study period. For health monitoring, daily checks were supplemented by detailed fortnightly evaluations. Foot health was assessed by inspecting hooves for lesions or abnormalities, leg health was examined for fractures or structural issues, and skin condition was scrutinized for lesions or irregularities. This multi-dimensional approach ensured comprehensive tracking of calf development, behavior, and welfare throughout the study.

Statistical Analysis

Statistical analysis was conducted using JMP software (version 7.0). A one-way ANOVA compared mean values among treatment groups, and Tukey's post hoc test identified significant differences, with a significance level set at $P < 0.05$.

Results

Fortnightly Body Weight Gain (kg) of Calves Under Different Bedding Materials

The fortnightly body weight gains of Red Sindhi calves reared on distinct bedding materials are summarized in Table 2. Statistical analysis revealed significant differences ($P < 0.05$) among groups, with calves in Group C (rice straw bedding) exhibiting the highest cumulative weight gain (134.375 kg) by the 7th fortnight, surpassing Group B (wheat straw: 129 kg) and Group A (control: 118.25 kg). Progressive increases in weight gain were observed across all groups, with Group C demonstrating superior performance in later fortnights ($P < 0.0001$ for fortnights 5–7), indicative of a sustained growth advantage.

Table 2 Fortnightly weight gain (kg) of Red Sindhi cattle calves under different bedding material

Fortnight	Group A (Control)(mean± SD)	Group B (Wheat Straw) (mean± SD)	Group C (Rice Straw) (mean± SD)	*p*-Value
1st	82.625±1.25	82.125±1.37689	82.625±1.10868	0.8119
2nd	83.75±1.32288	83.875±1.31498	84.5±0.91287	0.6517
3rd	86.5±1.29099	88.75±1.75594	89.25±0.95743	0.0432*
4th	91.5±1.29099	95.5±1.73205	97.375±0.94648	0.0005*
5th	98.25±1.25831	105.625±1.60078	108.25±0.95743	<.0001*
6th	107.25±1.25831	116.875±1.65202	120.5±1.29099	<.0001*
7th	118.25±1.25831	129±1.82574	134.375±1.88746	<.0001*

Fortnightly Body Height (cm) of Calves Under Different Bedding Materials

Body height measurements are presented in Table 3. Group C achieved the greatest mean height (118 cm) by the final fortnight, significantly outperforming Group B (113.125 cm) and Group A (108.5 cm) ($P = 0.0009$). While no differences were observed in early fortnights ($P > 0.05$), divergences became pronounced from the 4th fortnight onward, highlighting the long-term impact of bedding material on skeletal development.

Table 3 Fortnightly body height (cm) of Red Sindhi cattle calves under different bedding material

Fortnight	Group A (Control)(mean± SD)	Group B (Wheat Straw) (mean± SD)	Group C (Rice Straw) (mean± SD)	*p*-Value
1st	84.75±1.70783	84.75±1.70783	84.5±1.29099	0.9673
2nd	85.5±1.91485	85.75±1.70783	86.5±1.29099	0.6855
3rd	87.375±2.05649	88.75±1.70783	89.625±1.49304	0.2458
4th	90.25±2.21736	93±1.63299	94.5±1.29099	0.0218*
5th	94.25±2.21736	98.25±1.70783	100.625±1.49304	0.0026*
6th	100±100	104.5±104.5	107.5±107.5	0.0013*
7th	108.5±3.10913	113.125±1.75	118±1.82574	0.0009*

Fortnightly Body Length (cm) of Calves Under Different Bedding Materials

Body length trajectories are detailed in Table 4. Group C calves attained the maximum length (119.625 cm), significantly exceeding Group B (117.125 cm) and Group A (110.25 cm) by the 8th fortnight ($P = 0.0004$). The progressive divergence underscores the role of rice straw bedding in enhancing longitudinal growth.

Table 4 Fortnightly body length (cm) of Red Sindhi cattle calves under different bedding material

Fortnight	Group A (Control)(mean± SD)	Group B (Wheat Straw) (mean± SD)	Group C (Rice Straw) (mean± SD)	*p*-Value
1st	83.5±1.29099	83.75±1.70783	83.25±1.70783	0.9058
2nd	84.5±1.29099	84.875±1.93111	84.375±1.49304	0.9
3rd	86.25±1.5	88±2.16025	87.5±2.08167	0.4527
4th	91±1.82574	93.125±2.09662	93.5±2.08167	0.2187
5th	96.375±1.37689	100.5±2.64575	101±2.16025	0.0252*
6th	102.875±1.31498	108.375±2.49583	109.5±2.64575	0.0050*
7th	110.25±1.70783	117.125±2.25	119.625±2.3585	0.0004*

Fortnightly Body Girth (cm) of Calves Under Different Bedding Materials

As shown in Table 5, Group C calves achieved the largest girth (130.75 cm), with significant differences emerging from the 4th fortnight (P = 0.0245). This trend intensified over time, culminating in a 6.8% increase over Group A (122.375 cm) by the 7th fortnight (P = 0.0062), suggesting improved thoracic development in rice straw-reared calves.

Table 5 Fortnightly body girth (cm) of Red Sindhi cattle calves under different bedding material

Fortnight	Group A (Control)(mean± SD)	Group B (Wheat Straw) (mean± SD)	Group C (Rice Straw) (mean± SD)	*p*-Value
1st	93.75±1.70783	93.5±2.64575	93.25±2.21736	0.951
2nd	94.75±1.70783	95.5±2.64575	96.25±2.21736	0.6482
3rd	97±1.63299	98.5±2.64575	100.25±2.21736	0.1694
4th	101.125±1.65202	102.5±2.64575	106.25±2.21736	0.0245*
5th	108.25±2.5	108.75±2.21736	113±2.58199	0.0424*
6th	115±2.16025	116.5±2.64575	120.25±2.5	0.0364*
7th	122.375±1.70171	126±2.58199	130.75±3.59398	0.0062*

Lying Behavior of Calves Under Different Bedding Materials

The lying time of Red Sindhi cattle calves reared under different bedding materials was recorded fortnightly (Table 6). Statistically significant differences ($p < 0.05$) in lying time were observed among groups. Group C (rice straw) exhibited the longest lying time (208.375 ± 1.109 min), followed by Group B (wheat straw; 198.250 ± 1.708 min), while Group A (control) showed the shortest duration (188.750 ± 1.893 min).

Table 6. **Effect of bedding material on lying time (min) in Red Sindhi calves (mean ± SD).**

Fortnight	Group A (Control)	Group B (Wheat Straw)	Group C (Rice Straw)	*p*-Value
1st	176.750 ± 1.500	178.750 ± 0.957	181.000 ± 0.817	0.0017*
2nd	177.750 ± 1.500	180.250 ± 1.500	182.500 ± 0.577	0.0017*
3rd	179.000 ± 0.759	182.000 ± 0.759	184.750 ± 0.759	0.0016*
4th	181.000 ± 0.817	185.750 ± 1.708	195.500 ± 1.291	<0.0001*
5th	184.000 ± 0.817	190.500 ± 1.291	199.250 ± 1.258	<0.0001*
6th	186.250 ± 1.500	194.500 ± 1.291	203.500 ± 1.291	<0.0001*
7th	188.750 ± 1.893	198.250 ± 1.708	208.375 ± 1.109	<0.0001*

Standing Behavior of Calves Under Different Bedding Materials

Standing time differed significantly ($p < 0.05$) among groups (Table 7). Group A (control) had the longest standing time (141.500 ± 1.291 min), followed by Group B (wheat straw; 136.750 ± 1.708 min), while Group C (rice straw) showed the shortest duration (126.500 ± 1.080 min).

Table 7 Effect of bedding material on standing time (min) in Red Sindhi calves (mean ± SD).

Fortnight	Group A (Control)	Group B (Wheat Straw)	Group C (Rice Straw)	*p*-Value
1st	110.000 ± 0.817	108.500 ± 0.577	106.500 ± 1.291	0.0018*
2nd	111.000 ± 0.817	109.750 ± 0.957	107.500 ± 1.291	0.0032*
3rd	114.000 ± 0.817	112.500 ± 1.291	109.500 ± 1.291	0.0011*
4th	118.000 ± 0.817	116.750 ± 0.957	115.000 ± 0.817	0.0028*
5th	125.500 ± 0.577	123.500 ± 1.291	119.750 ± 0.957	<0.0001*
6th	131.000 ± 0.817	129.500 ± 1.291	124.250 ± 0.957	<0.0001*
7th	141.500 ± 1.291	136.750 ± 1.708	126.500 ± 1.080	<0.0001*

Feeding Behavior of Calves Under Different Bedding Materials

Feeding time varied significantly ($p < 0.05$) across groups (Table 8). Group C (rice straw) spent the most time feeding (28.00 ± 0.817 min/day), followed by Group B (25.50 ± 1.291 min/day), while Group A (control) spent the least (22.50 ± 1.291 min/day).

Table 8. Effect of bedding material on feeding time (min/day) in Red Sindhi calves (mean ± SD).

Fortnight	Group A (Control)	Group B (Wheat Straw)	Group C (Rice Straw)	*p*-Value
1st	14.50 ± 1.291	17.50 ± 1.291	19.75 ± 0.943	0.0005*
2nd	15.50 ± 1.291	18.63 ± 1.109	20.75 ± 0.943	0.0003*
3rd	16.50 ± 1.291	20.00 ± 0.817	22.75 ± 0.943	<0.0001*
4th	18.25 ± 0.957	21.50 ± 0.577	24.75 ± 0.427	<0.0001*
5th	20.25 ± 1.323	22.88 ± 1.315	26.00 ± 0.817	0.0002*
6th	21.25 ± 0.957	24.88 ± 1.315	27.00 ± 0.817	<0.0001*
7th	22.50 ± 1.291	25.50 ± 1.291	28.00 ± 0.817	0.0003*

Drinking Behavior of Calves Under Different Bedding Materials

Drinking time differed significantly ($p < 0.05$) in later fortnights (Table 9). Group C (rice straw) spent the longest time drinking (18.25 ± 0.645 min/day), followed by Group B (16.375 ± 0.479 min/day), while Group A (control) spent the least (15.25 ± 0.957 min/day).

Table 9. Effect of bedding material on drinking time (min/day) in Red Sindhi calves (mean ± SD).

Fortnight	Group A (Control)	Group B (Wheat Straw)	Group C (Rice Straw)	*p*-Value
1st	10.75 ± 1.190	10.75 ± 1.041	10.75 ± 1.190	1.000
2nd	11.50 ± 1.291	11.50 ± 1.291	11.50 ± 1.291	1.000
3rd	12.50 ± 0.913	12.25 ± 1.323	12.50 ± 1.291	0.943
4th	13.25 ± 0.957	13.50 ± 1.080	14.50 ± 1.291	0.296
5th	14.25 ± 0.645	14.25 ± 1.323	16.25 ± 0.957	0.0317*
6th	15.00 ± 0.707	15.75 ± 0.645	17.75 ± 0.645	0.0007*
7th	15.25 ± 0.957	16.375 ± 0.479	18.25 ± 0.645	0.0008*

Foot, Leg, and Skin Health of Calves Under Different Bedding Materials

Health outcomes varied across groups (Table 10). Lameness, swollen legs, and skin lesions were observed in Group A (control), whereas these issues were absent in Groups B (wheat straw) and C (rice straw).

Table 10 Foot, leg, and skin health of Red Sindhi calves under different bedding materials.

Observation	Group A (Control)	Group B (Wheat Straw)	Group C (Rice Straw)
Lameness	Present	Absent	Absent
Swollen legs	Present	Absent	Absent
Skin lesions	Present	Absent	Absent

Discussion

The findings of this study highlight the significant impact of bedding material on the fortnightly weight gain of calves. Calves raised on rice straw bedding (Group C) exhibited the highest average fortnightly weight gain, followed by those on wheat straw bedding (Group B), while the lowest gains were observed in calves kept on katcha floor bedding (Group A). Previous research supports the conclusion that bedding material influences calf growth rates. Rice straw bedding provides better thermal insulation and comfort than other materials, reducing stress and enhancing feed intake and efficiency (Tucker et al., 2009; Wagner et al., 2012). Improved comfort levels contribute to better resting and sleep patterns, which positively affect growth performance and overall health, particularly during colder seasons (Jensen et al., 2005; Fregonesi et al., 2007). Additionally, rice straw bedding is highly absorbent, reducing moisture accumulation and microbial load, thereby lowering the risk of disease (Panivivat et al., 2004; Hogan et al., 1999).

Animal welfare indicators, such as comfort, hygiene, stress levels, and growth rates, are closely linked to bedding quality. Rice et al. (2011) found that rice straw, due to its superior absorbency and cushioning properties, enhances calf development. Anderson et al. (2013) further noted that calves on rice straw bedding experienced fewer fluctuations in body temperature, which is essential for proper metabolic function and growth. In contrast, while wheat straw is effective in providing a dry resting area, it does not retain heat as efficiently as rice straw (El-Mashad et al., 2017). Over time, wheat straw compacts, reducing its ability to maintain a warm and dry environment (Webster et al., 1985; Blackshaw & Blackshaw, 1994). This diminished thermal insulation may increase the incidence of respiratory diseases and other health complications, potentially explaining the lower weight gain observed in calves on wheat straw bedding.

The lowest weight gains in Group A, raised on katcha flooring, underscore the inadequacy of non-absorbent and hard flooring materials. Katcha floors, often composed of compacted earth, expose calves to higher moisture levels, increasing the likelihood of infections that can lead to respiratory and gastrointestinal illnesses (Chua et al., 2002; Tucker et al., 2009). These health issues significantly hinder growth, as reflected in the modest weight increases observed in Group A calves. The choice of bedding material is, therefore, critical in ensuring optimal growth conditions for calves. Rice straw bedding offers the most favorable conditions due to its superior comfort, hygiene, and thermal insulation (Borderas et al., 2007; Bewley et al., 2008). In contrast, katcha flooring exacerbates stress and hypothermia risks due to greater exposure to cold and moisture (Vanegas et al., 2006; Ruud et al., 2010).

Rice straw bedding's higher comfort value and superior thermal insulation contribute to reduced stress levels, which in turn foster better sleep and resting behaviors, positively impacting growth performance (Sutherland et al., 2022; Haskell et al., 2023). Lower stress levels are generally associated with improved body growth (Fraser et al., 2021). Additionally, rice straw's ability to absorb moisture effectively maintains a dry and hygienic environment, reducing the risk of infections and disorders that may otherwise hinder growth (Mee et al., 2019; Gonzalez et al., 2020). Although wheat straw bedding also improves growth performance, it is less effective than rice straw due to its tendency to compact and offer lower moisture control and thermal comfort (Kling-Eveillard et al., 2021; Renaud et

al., 2022). Increased contact with damp surfaces in wheat straw bedding may elevate the risk of respiratory diseases and other health issues, negatively affecting growth rates (Rushen et al., 2020; Van Dorp et al., 2021).

Calves on katcha flooring recorded the lowest weight gain, likely due to the poor insulation and discomfort associated with this bedding type, which increases stress and slows growth (Van Os et al., 2022; Coleman et al., 2023). Inadequate moisture control further exacerbates the risk of disease and physical discomfort (Mee et al., 2020; Bach et al., 2021). These combined factors resulted in significantly lower body height, length, and girth in Group A calves. Conversely, Group C calves, raised on rice straw bedding, demonstrated the highest values for these growth parameters, followed by Group B (wheat straw bedding). While the growth performance of Group B calves was notable, it remained lower than that of Group C, reinforcing the superior qualities of rice straw bedding in terms of thermal insulation and moisture management (Mee et al., 2019; Gonzalez et al., 2020). These findings align with broader research indicating that optimal bedding conditions play a crucial role in calf health and growth (Mee et al., 2019; Gonzalez et al., 2020; Rushen et al., 2020; Sutherland et al., 2022; Haskell et al., 2023). Improved bedding materials have been linked to increased locomotor behaviors and longer lying durations, both of which contribute to better growth and well-being (Rushen et al., 2020; Haskell et al., 2023).

The time spent resting and standing varied significantly among groups, reflecting differences in environmental comfort. Group C calves exhibited the longest lying durations, followed by Group B, with Group A calves standing for the longest periods. Gooch et al. (2014) noted that bedding material significantly influences calf comfort and lying behavior, with softer materials being preferred due to their supportive and cushioning properties (Boivin et al., 2003). Clean, dry bedding has also been shown to reduce illness rates (Cook et al., 2016). Studies suggest that bedding materials such as wood shavings and straw have high moisture-absorption capacities, ensuring dry and hygienic resting areas, which promote calf growth (Svensson et al., 2014). The superior absorbency of rice straw bedding in Group C likely contributed to longer resting durations and improved growth performance.

Temperature regulation also plays a crucial role in calf health and development. Bedding materials that provide adequate thermal insulation protect calves from extreme temperature fluctuations (Rushen et al., 2010). DeVries et al. (2004) observed that improved heat comfort can positively impact calf growth. Group C calves likely experienced greater heat comfort due to the insulating properties of rice straw bedding, which encouraged longer resting periods (Weary et al., 2002). Social interactions and group dynamics also influence resting behaviors, as calves prefer specific lying spots within their social groups (Rushen et al., 2007). The lying patterns observed in Group C suggest that rice straw bedding created a more socially accommodating environment, supporting longer rest durations.

Bedding material also affects feeding behavior and overall productivity. Factors such as comfort, accessibility to feed, and group dynamics influence calf feeding habits. Providing appropriate bedding materials and comfortable resting areas creates a peaceful feeding environment (von Keyserlingk et al., 2009). Group C calves, which spent the longest time feeding, likely had the most favorable conditions for prolonged feeding durations. Access to high-quality, palatable feed also plays a role in feeding behavior (Khan et al., 2012; Jenkins et al., 2008).

The condition of the hooves, legs, and skin in Sindhi Red cattle calves varied across bedding groups, further demonstrating the impact of bedding on animal welfare. Group A calves exhibited signs of lower limb inflammation, swelling, and skin lesions, likely due to prolonged exposure to poor floor conditions. Studies indicate that suboptimal flooring conditions contribute to dermatitis, skin ulcers, and environmental stress in cattle (Svensson et al., 2014; Whay et al., 2003). In contrast, Groups B and C, with sufficient bedding support, had no

reports of such health issues, reinforcing the benefits of absorbent materials like straw and wood shavings in maintaining hygiene and reducing physical discomfort (Cook et al., 2016).

Conclusion

The study concludes that rice straw bedding (Group C) significantly improves the growth performance, behavior, and health status of Red Sindhi cattle calves compared to wheat straw bedding (Group B) and the katcha floor (Group A). These findings highlight the crucial role of appropriate bedding materials in enhancing calf welfare and productivity. Implementing rice straw bedding can lead to better overall development and well-being in calves, ensuring healthier and more productive livestock.

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