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Evaluating comfort of heifer calves using behavioural activities in different housing systems

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Abstract

Evaluating the housing system that provide comfort behaviour is important associated with welfare of animals. This study assessed the effects of tie-barn and loose housing systems on the behavioral responses of 20 crossbred heifer calves aged 5-7 months over six months. Both groups were fed a Total Mixed Ration (13% crude protein, 60% total digestible nutrients) at 3% of body weight (dry matter basis) with continuous water access. Calves in tie-barns spent significantly more time eating (4.25 ± 0.13 hours) compared to those in loose housing (3.95 ± 0.09 hours, $p < 0.001$), indicating housing system impacts on behavior and welfare. However, there were no significant differences in ruminating time (tie barn: 9.5 ± 0.763 hours; loose house: 11.8 ± 1.077 hours, $p = 0.107$) or drinking frequency (tie barn: 5 ± 0.577 ; loose house: 4.1 ± 0.307 , $p = 0.231$). Lying time (tie barn: 10.58 ± 1.32 minutes; loose house: 10.32 ± 1.37 minutes, $p = 0.427$) and lying frequency (tie barn: 8.2 ± 1 ; loose house: 9.1 ± 0.666 , $p = 0.787$) were also similar between the two systems. Loose housed animals displayed more comfort behaviours, such as stretching frequently (4.5 ± 0.428) compared to tie barn animals (1.8 ± 0.307 , $p < 0.001$). Additionally, loose housed animals exhibited significantly more social behaviours, such as head play (6 ± 0.856 vs. 0.6 ± 0.333 , $p < 0.001$) and allogrooming (106.8 ± 2.749 vs. 64 ± 1.29 , $p < 0.001$), indicating greater social interaction and bonding. One tie barn animal showed persistent tongue rolling, suggesting potential stress and abnormal behaviours linked to confinement.

Keywords: Housing, eating behaviour, ruminating behaviour, drinking behaviour, lying behaviour, agonistic and non-agonistic behaviour. respiration

Introduction

Housing systems in livestock management play a critical role in influencing the welfare, productivity, and overall comfort of farm animals. For young heifers, housing environments impact their growth, physical health, social interactions, and behavioural development. Traditional housing systems, such as tie barns, are commonly used to restrict animal movement and maintain organized feeding and care routines. However, loose housing systems, which provide animals with more space and freedom to engage in natural behaviours, are increasingly considered for their potential welfare benefits.

Behavioural assessment has become a widely accepted method for evaluating animal welfare and comfort in different housing setups. Specific behaviours, such as eating, drinking, ruminating, lying, social interactions, and signs of discomfort or stress, provide essential insights into the adaptability and well-being of animals under varied environmental conditions. In this study, the behavioural activities of heifer calves were observed under two distinct housing conditions: a conventional tie barn and a loose housing system. By evaluating differences in activity patterns and physiological responses, this study aims to explore how these housing systems affect animal welfare, with a focus on social and comfort behaviours as indicators of environmental suitability.

Through continuous observation and detailed recording of diurnal and social behaviours, as well as physiological measures like respiratory rate, pulse, and rectal temperature, this study seeks to provide comprehensive insights into the effects of housing systems on the comfort and health of heifer calves.

The findings are expected to contribute to better housing design and management practices that enhance animal welfare and optimize production outcomes.

Materials and Methods

This study was carried out at the Livestock Research Station, Thiruvazhamkunnu. The study involved twenty heifer calves, initially housed individually in hutches until six months of age, and then assigned to two treatment groups based on housing systems for six months, from February to August 2024. Treatment 1 utilized a conventional tie barn (3.3 m² per animal), while Treatment 2 featured a loose housing system (20 m² per animals), with both groups receiving the same Total Mixed Ration (TMR) diet adjusted biweekly according to body weight. Feed intake was monitored daily, and the heifers had free access to water, with deworming conducted at the start of the treatment and every three months thereafter. Behavioural data of the experimental animals was collected through visual inspection of camera recordings over a 24-hour period at monthly intervals from both the tie barn and loose housing systems as per Akbarian-Tefaghi *et al.* (2022) [2] using two surveillance cameras.

Feeding behaviour was assessed by recording the duration of eating, defined as the time the heifer's head was in the trough ingesting total mixed ration (TMR). Drinking was documented by counting the instances when the animal's mouth was inside the water trough. Rest and rumination behaviours were also evaluated: lying was defined as time spent on either flank or sternum with the head raised or down, and rumination was identified as repetitive chewing without visible food in the mouth, observed while standing or lying. Social interactions were analysed according to Boyle *et al.* (2008) [4] and classified into comfort, playful, agonistic, and non-agonistic behaviours. Comfort behaviours included stretching (straightening limbs) and self-grooming (licking parts of the body). Playful behaviors comprised head play (rubbing heads together), head against body (non-pushing contact with another animal's body), and small butts (gentle, non-aggressive head contact). Agonistic behaviours involved efficient butts (violent head or horn contact causing the recipient to turn away) and pushing (head contact with body, followed by a pushing action). Non-agonistic interactions included allogrooming (licking another animal) and sniffing (extending the nose toward another). All behaviors were recorded and analyzed to compare their frequency and duration in tie-barn and loose-housing systems, providing insight into the impact of housing types on heifer behavior.

Statistical analysis

The collected data were analysed by analysis of variance (ANOVA) using SPSS (Statistical Package for Social Science) version 24.

Results and Discussion

Diurnal Behaviour

Eating time

The current study revealed a statistically significant difference in eating duration between animals housed in tie barns and those in loose housing. Animals in tie barns spent an average of 4.25±0.13 hours eating, compared to 3.95±0.09 hours for those in loose housing ($p < 0.001$, $t = 11.206$). This indicates that tie-barn housing facilitates extended eating durations compared to loose housing systems. This finding aligns with the observations of Eldahshan *et al.* (2024) [9], who reported that buffalo heifers in tied housing spent more time eating

(306.13 minutes daily) than their counterparts in loose housing (178.66 minutes daily). Similarly, earlier studies by Haley *et al.* (2000) [15] and Ingrand *et al.* (2000) [17] indicated that tie-stall housing provides a more stable and predictable feeding environment, which may encourage prolonged eating behaviors by minimizing competition and external disturbances.

Conversely, contrasting evidence from Czako *et al.* (1984) [8] suggests that dairy cows in loose housing spent 15 to 30% more time feeding than those in tied housing. Czako *et al.* [8] attributed this increase to the influence of social interactions and the opportunity for physiological breaks, which are often more pronounced in loose housing systems. The variation between these findings may reflect differences in the social dynamics and space availability in tie-stall versus loose housing systems, which can significantly influence feeding behavior.

The extended eating duration observed in tie-barn housing in this study may be attributed to reduced social competition and fewer interruptions during feeding. Hellgren *et al.* (2005) [16] highlighted that tie-stall housing minimizes disturbances, allowing animals to feed uninterrupted. Additionally, Lindstrom and Redbo (2000) [25] noted that longer feeding and ruminating periods in tie stalls could decrease oral stereotypies, promoting a calmer and less stressful eating environment.

These results underscore the importance of housing systems in shaping feeding behaviors, which could have implications for animal health, welfare, and productivity. The predictable and stable environment in tie-stall systems appears to support more structured feeding patterns, potentially contributing to improved growth and production metrics.

Ruminating time

In this study, ruminating behavior was observed in animals housed under two different systems: tie barns and loose housing. The average daily ruminating time for animals in tie barns was 9.5±0.763 hours, while those in loose housing ruminated for 11.8±1.077 hours. Despite the numerical difference, the results were not statistically significant ($p = 0.107$, $t = -1.766$). These findings suggest that the type of housing system may not markedly influence the total daily ruminating time, aligning with the idea that housing systems alone are not the primary determinants of this behavior. It was observed that the rumination commenced 45 to 60 minutes after feeding, which is consistent with observations by Radostits *et al.* (2007), who reported that cows typically begin ruminating 30 to 90 minutes post-feeding. Factors such as diet composition and the physical texture of ruminal contents likely play a pivotal role in determining the onset and duration of rumination. These results highlight the critical role of nutritional management in both housing systems to support optimal rumination.

The findings of this study align with Jana *et al.* (1988) [18], who reported an average daily ruminating time of 528 minutes (8.8 hours) in crossbred cows, with most ruminating occurring at night. Also Metz (1975) [28] reported daily ruminating times ranging from 464 to 579 minutes (7.7 to 9.7 hours). The observed ruminating times in this study fall within this range, suggesting that animals in both housing systems effectively engage in this essential physiological activity. Contrasting findings have been reported in some literature regarding the impact of housing systems on ruminating behavior. Empel *et al.* (1993) [11] observed that cows in loose housing ruminated less than those in tie stalls,

which contrasts with our findings. However, El-Kaschab *et al.* (2009) ^[10] noted that buffalo calves in loose housing ruminated for longer durations than those in tie stalls, supporting the trend observed in our study. Such discrepancies might be attributed to differences in dietary formulations, management practices, and environmental conditions.

Drinking frequency

The current study revealed no statistically significant difference in drinking frequency between the tie-barn (5 ± 0.577 drinking sessions/day) and loose housing systems (4.1 ± 0.307 drinking sessions/day), with p-value of 0.231 and a t-value of 1.274. This finding suggests that the hydration behaviors of cattle are comparable across both housing environments, aligning with the understanding that drinking frequency is influenced by a complex interplay of environmental conditions, management practices, and individual animal needs. Adequate water intake is a critical requirement for cattle to support physiological functions, including maintenance, growth, fattening, pregnancy, and lactation (Agricultural Research Council [ARC], 1980) ^[1]. Wagner *et al.* (2021) emphasized ^[40] that factors such as body size, stage of production, and environmental conditions significantly influence total water intake. Although the current study found no significant difference in drinking frequency between the two housing systems, other research has reported variations in water consumption patterns linked to housing systems. For instance, Choure Kuldeep Kalyanrao (2011) ^[6] found that crossbred cattle in loose housing consumed significantly more water daily (41.12 liters) compared to those in conventional tie-barns (38.03 liters, $p < 0.05$). These discrepancies may be attributed to differences in water accessibility, microclimatic conditions, or specific housing modifications. Jat (2016) ^[19] observed higher water intake per kilogram of dry matter consumed among calves housed in conventional barns compared to those in loose housing. Additionally, Wagner *et al.* (2021) noted ^[40] that water intake tends to increase with rising ambient temperatures, underscoring the critical role of ensuring consistent water access during warmer conditions. Restricted water access has been associated with decreased feed intake and overall performance in cattle (Scharf *et al.*, 2008; Silanikove, 1992) ^[34, 35]. These considerations are especially important during stages of high physiological demand, such as lactation and pregnancy (Kume *et al.*, 2010) ^[22].

Lying time

In this study, the lying time of dairy cattle was analysed to assess the impact of housing systems on their resting behaviour. The results revealed no significant difference in lying time between the two housing systems ($p = 0.427$, $t = 0.828$). Cows in tie-barn housing lay down for an average of 10.58 ± 1.32 hours per day, while those in loose housing averaged 10.32 ± 1.37 hours. These findings are consistent with prior research on housing type and lying behaviour in dairy cattle. Several studies have highlighted the factors influencing lying time in cattle. For example, Haley *et al.* (2000) ^[15] and Popescu *et al.* (2014) ^[32] observed that tie-stall systems may reduce lying time due to restricted movement and potential discomfort. However, in this study, the slightly longer lying time in tie barns may be attributed to the limited activity options, encouraging more resting behaviour. Environmental factors and space availability significantly influence lying behaviour, as reported by Fregonesi *et al.*

(2009) ^[12], who found that increasing stall space to 10 m² per cow in open pack systems resulted in longer lying times. This emphasizes the importance of space and comfort in cattle housing. Similarly, Tucker *et al.* (2004) ^[39] noted that bedding design and quality affect lying durations, with better bedding enhancing resting times. The findings in this study align with Krohn and Munksgaard (1993) ^[21], who reported that cows in tie-stall systems generally have slightly longer lying durations than those in loose housing. This is further corroborated by Geetha (2021) ^[14], who found crossbred dairy cows on rubber mats lay for an average of 11.15 ± 0.05 hours daily, and Charlton *et al.* (2014) ^[5], who reported lying times ranging from 8.7 to 13.2 hours in cubicle systems. These figures confirm that the observed lying times in this study are within the normal behavioral range for dairy cattle.

Tanuwiria *et al.* (2022) ^[37] highlighted that higher temperatures may lead cows to lie down more to alleviate heat stress, while Andreasen and Forkman (2012) ^[3] stressed that lying times below 12 hours per day could indicate stress, underscoring the role of housing design in promoting sufficient rest and overall welfare. Since cows in tie-barn housing and loose house system showed no significant difference in lying time, both housing systems provide adequate resting opportunities. Proper management of environmental and comfort factors is crucial to ensuring optimal welfare and lying behavior in dairy cattle.

Lying frequency

The frequency of lying was non significantly higher in the loose housing system (9.1 ± 0.666) compared to the tie-barn system (8.2 ± 1), with p-value of 0.787 and t-value of 0.277. El-Kaschab *et al.* (2009) ^[10] and Krohn and Munksgaard (1993) ^[21] suggested that cows in loose housing systems lie down more frequently due to increased freedom of movement. Factors such as bedding quality and the availability of resting space, which are known to influence lying behaviours, may explain this outcome. Ostojic *et al.* (2011) ^[29] reported that cows in tethered systems often face challenges, such as frequent interruptions and increased risk of collisions when attempting to lie down. Conversely, loose housing allows cows to transition from standing to lying with fewer barriers, as noted by Popescu *et al.* (2014) ^[32]. Despite these advantages, the current study found no significant differences, possibly reflecting optimal management and provision of resources in both housing types. Lying frequency is not only a behavioural metric but also a welfare indicator. Singh *et al.* (1994) ^[36] highlighted that cows with health issues, such as lameness, tend to lie down more frequently due to discomfort in standing or walking.

Social Behaviour

Comfort behaviour

A significant difference was observed in the frequency of stretching behaviour between animals housed in loose housing and tie-barn systems. Animals in loose housing exhibited a higher average of stretching events (4.5 ± 0.428) compared to those in tie barns (1.8 ± 0.307), with the difference being statistically significant ($p < 0.001$, $t = -5.059^*$). This result suggests that the loose housing environment provides greater comfort and mobility, allowing animals to engage in natural behaviours such as stretching more frequently. These findings align with El-Kaschab *et al.* (2009) ^[10], who reported that buffalo calves in loose housing spent significantly more time lying flat on their sides (172.86 ± 1.34 minutes) compared to calves in tie stalls

(149.51±1.51 minutes; $P < 0.01$). The ability to adopt relaxed postures and stretch freely is indicative of improved animal welfare, as such behaviours are often restricted in tie-barn setups. Enhanced comfort and mobility in loose housing may facilitate natural behavioural expressions that contribute positively to the overall well-being of the animals.

In contrast, no significant difference was observed in self-grooming behaviour between the two housing systems. Animals in tie barns exhibited an average of 124.6±3.363 self-grooming events, while those in loose housing showed 117±2.792 events ($p = 0.110$, $t = -1.753$). However, a non-significantly higher frequency of self-grooming was noticed in tie barns. Previous studies provide varied insights into this behaviour. Krohn (1994) [20] found that self-grooming was reduced in cows housed in loose housing compared to tethered groups, while Loberg *et al.* (2004) [26] noted that, tied cows allowed access to outdoor paddocks led to decreased self-grooming, likely due to increased opportunities for exploration and engagement in natural behaviours outdoors. Conversely, studies by Gautam *et al.* (2012) and Patel *et al.* (2016) [30] reported higher frequencies of self-grooming in conventional housing systems, suggesting that limited movement in such environments may lead animals to self-groom more as a stress-relieving activity.

The findings regarding stretching behaviour strongly indicate that loose housing systems enhance animal comfort by providing greater physical freedom, encouraging behaviours such as stretching and natural resting postures. This increased mobility and alignment with natural behavioural patterns likely improve the overall welfare of animals in loose housing. While the results on self-grooming behaviour do not show significant differences, the tendency for higher grooming activity in tie-barn systems could reflect compensatory behaviours to mitigate stress or discomfort. Together, these findings highlight the advantages of loose housing in promoting natural behaviours and improving the physical and psychological well-being of animals.

Playing behaviour

The study revealed significant differences in playing behaviors for animals in loose housing and tie-barn systems, emphasizing the impact of housing on social interactions and welfare. Animals in loose housing demonstrated substantially higher frequencies of playful behaviors, such as head play, head-to-head contact, and small butting, compared to those in tie barns. These behaviors indicate improved opportunities for social interaction and reduced confinement stress in loose housing environments. Loose-housed animals engaged in head play significantly more often (6±0.856) compared to animals in tie barns (0.6±0.333), with a highly significant statistical difference ($p < 0.001$, $t = -5.80^*$). This finding aligns with Popescu *et al.* (2014) [32], who reported similar trends, highlighting the role of loose housing in promoting interactive behaviors essential for social development. Furthermore, animals in loose housing were observed resting or pressing their heads together more frequently (5.5±0.562) than those in tie barns (0.2±0.166), with a statistically significant difference ($p < 0.001$, $t = -9.08^*$). Such behavior reflects increased opportunities for physical bonding and social interaction in an open housing system, corroborating findings by El-Kaschab *et al.* (2009) [10]. Small butting behaviors were also more common in loose housing (3±0.365) than in tie barns (0.5±0.341), with a significant difference ($p = 0.001$, $t = -5^*$). These results are consistent with El-Kaschab *et al.* (2009) [10] and Reinhardt *et al.* (1978)

[33], who observed that the freedom to interact in loose housing fosters natural behaviors such as butting, often seen as playful and indicative of reduced stress. The observed differences highlight the benefits of loose housing, which provides animals with a more open and enriched environment. The freedom of movement and the ability to engage in natural behaviors contribute to improved animal welfare by reducing stress and enhancing social interactions. In contrast, tie-barn systems restrict movement and limit opportunities for social engagement, leading to a reduction in such behaviors. Overall, the findings underscore the advantages of loose housing in promoting social bonding, playful activities, and overall well-being among animals.

Agonistic interactions

The current study revealed that housing systems significantly influence agonistic behaviors among animals, with loose housing showing a notably higher frequency of such interactions compared to tie barns. Specifically, the number of efficient butts was significantly greater in loose housing (3.6±0.333) compared to tie barns (2.3±0.333), with a p -value of 0.018 and a t -value of 2.828. Additionally, pushing behavior was observed much more frequently in loose housing (10.5±0.562) than in tie barns (0.333±0.21), a difference that was highly significant ($p < 0.001$, $t = -16.91$). These findings suggest that the housing system directly influences the expression of agonistic interactions, with loose housing environments fostering a higher incidence of such behaviours. These results align with findings of El-Kaschab *et al.* (2009) [10], who reported that buffalo calves in loose housing exhibited greater frequencies of fighting and butting compared to those in tie stalls. Similarly, Hellgren *et al.* (2005) [16] observed fewer aggressive interactions in tie-stall systems than in loose housing, proposing that aggression in less restrictive environments might reflect natural social behaviours rather than negative welfare outcomes. This perspective is supported by Le Neindre (1993) [24], who found that tethered animals in tie stalls had fewer opportunities for aggressive encounters due to limited interaction possibilities. Menke *et al.* (2000) [27] observed that aggressive encounters often occurred near feeding and watering areas, which are more accessible in loose housing systems, potentially contributing to the higher incidence of aggression. The increased expression of agonistic behaviours, particularly pushing, in loose housing systems observed in the present study likely stems from the greater freedom afforded to animals in these settings. This freedom enables natural social interactions and the establishment of hierarchies but also increases competition for limited resources. Loose housing systems facilitate natural behaviours but may increase competitive aggression, while tie stalls reduce such interactions at the cost of restricting movement.

Non-Agonistic behaviour

The present study highlights the significant influence of housing systems on the social behaviours of dairy cattle, particularly focusing on non-agonistic interactions such as allogrooming and sniffing. Animals in loose housing were observed to engage in allogrooming significantly more frequently (106.8±2.749) compared to those in tie-barn systems (64±1.29), demonstrating a stronger social bond among individuals in the former system ($p < 0.001$, $t = -14.1$). Similarly, loose-housed animals exhibited a higher frequency of social sniffing (3.3±0.557) than that in tie-barn system (0.2±0.166), indicating enhanced social exploration within the

group ($p < 0.001$, $t = -5.439$). The results align with previous research by Krohn (1994) [20], who reported that cows in extensive housing systems, such as loose housing or pasture, displayed higher frequencies of social behaviours like grooming and sniffing compared to those in confined systems. This observation reinforces the notion that naturalistic environments foster the development of social bonds and exploratory behaviours. Furthermore, Reinhardt *et al.* (1978) [33] emphasized that social licking mostly noticed around the head and neck, is shaped by environmental and social factors, supporting the current findings on the significance of housing systems in shaping social interactions.

Other abnormal behaviours- Tongue rolling

The tongue-rolling behaviour observed in one animal housed within the tie-barn system highlights potential welfare concerns associated with restrictive housing environments. This repetitive action, frequently noted during the monitoring period, suggests stress, boredom, or discomfort as possible underlying factors. The limited mobility and restriction of natural behaviours in tie-barn system may exacerbate these issues, leading to the development of abnormal behaviour patterns. The findings are consistent with findings of Corazzin *et al.* (2010) [7], who demonstrated that dairy cows housed in tie stalls exhibited reduced tongue-playing behaviours when provided access to outdoor grazing during summer. Similarly, studies by LeNeindre (1993) [24], Pempek *et al.* (2016) [31], and Tapki *et al.* (2007) [38] revealed higher occurrences of abnormal behaviours such as tongue-playing, non-nutritive sucking, and object licking among individually housed calves

compared to those in group housing. These observations reinforce the importance of environments that promote natural behaviours and social interactions in reducing stress and enhancing animal welfare. The development of tongue-rolling behaviour in the observed animal underscores the complex interplay between environmental restrictions and behavioural outcomes. Confinement in tie-barn systems limits essential activities such as grazing, socializing, and exploring, thereby increasing stress and lead to development abnormal behaviours, which highlights the negative impact of restrictive housing on dairy cattle behavior and welfare.

Physiological Parameters

Throughout the study, heifer calves in tie barns exhibited significantly higher respiratory rates than those in loose housing, with averages of 67.0 ± 2.684 breaths per minute in the tie barn compared to 48.1 ± 2.235 in the loose house during the first fortnight ($P < 0.01$, $F = 19.75$), a trend that persisted until the rainy season. In contrast, during the summer, pulse rates for calves in tie barns ranged from 55.4 to 67.8 bpm, while those in loose housing ranged from 61.4 to 84 bpm, with a statistically significant difference ($P < 0.05$), which diminished after the onset of heavy rain in the seventh fortnight. Furthermore, rectal temperatures were higher in loose housing (e.g., 39.0 ± 0.33 °C) compared to tie barns (38.4 ± 0.20 °C) in the first fortnight, indicating greater heat exposure in loose housing ($P = 0.04$). This trend of increased rectal temperature in loose house compared to tie barn persist throughout the study.

Table 1: Monthly Mean behaviour in tie barn and loose house, (Mean $\pm$ SE)

Parameter	Tie barn (mean $\pm$ Standard deviation)	Loose house (mean $\pm$ Standard deviation)	P value	T value
Eating time (hr)	4.25 $\pm$ 0.13	3.95 $\pm$ 0.09	< 0.001	11.206*
Ruminating time (hr)	9.5 $\pm$ 0.763	11.8 $\pm$ 1.077	0.107	-1.766
Lying time (hr)	10.58 $\pm$ 1.32	10.32 $\pm$ 1.37	0.427	0.828
Lying frequency	8.2 $\pm$ 1	9.1 $\pm$ 0.666	0.787	0.277
Drinking Frequency	5 $\pm$ 0.577	4.1 $\pm$ 0.307	0.231	1.274
No of stretch	1.8 $\pm$ 0.307	4.5 $\pm$ 0.428	< 0.001	-5.059*
No. of self-grooming	124.6 $\pm$ 3.363	117 $\pm$ 2.792	0.110	-1.753
No of head play	0.6 $\pm$ 0.333	6 $\pm$ 0.856	< 0.001	-5.80*
No of head against body	0.2 $\pm$ 0.166	5.5 $\pm$ 0.562	< 0.001	-9.08*
No of small butts	0.5 $\pm$ 0.341	3 $\pm$ 0.365	0.001	-5*
No of efficient butt	2.3 $\pm$ 0.333	3.6 $\pm$ 0.333	0.018	2.828*
No of pushing	0.333 $\pm$ 0.21	10.5 $\pm$ 0.562	< 0.001	-16.91*
No of allogrooming	64 $\pm$ 1.29	106.8 $\pm$ 2.749	< 0.001	-14.1*
No of sniffing	0.2 $\pm$ 0.166	3.3 $\pm$ 0.557	< 0.001	-5.439*

*Significantly different at the .05 level.

Conclusion

This study concludes that loose housing systems provide greater comfort and social engagement for heifer calves compared to traditional tie barns. Animals in loose housing showed significantly more comfort and social behaviours, such as stretching, head play, and allogrooming, indicating enhanced welfare. The tie barn calves, however, spent more time eating but also displayed potential stress-related behaviours, such as persistent tongue rolling. Physiologically, tie-barn calves had higher respiratory rates, suggesting that confined housing may increase stress, while loose-housed calves had higher rectal temperatures due to greater heat exposure. Overall, loose housing systems may better support calf welfare by promoting natural behaviours and reducing confinement stress.

Conflict of Interest: Not available.

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