Calf Housing Characteristics for Optimal Health and Welfare

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Housing plays a crucial role in the early development of dairy calves, influencing their growth, behavior, and overall health. Specifically, individual versus social housing, bedding management, stocking density, and ventilation are all key considerations for how calves are housed.

Individual versus Social Housing for Young Calves

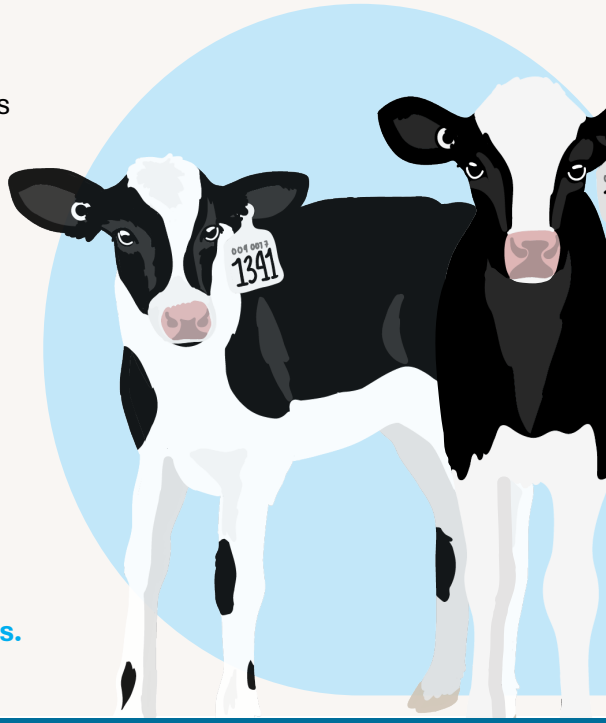
According to the Code of Practice for the Care and Handling of Dairy Cattle (March 2023), by April 1, 2031 healthy and thriving calves, when housed indoors, must be in pairs or groups by 4 weeks of age. Farmers should work with their advisors to develop a plan for transitioning to social housing by 2031. This requirement aligns not only with consumer expectations but also with a growing body of scientific evidence demonstrating a natural preference for social housing during early life[1] and other benefits as outlined below.

Age at pairing or grouping

The timing of pairing or grouping dairy calves significantly impacts their health and welfare. **Research shows that introducing calves to groups as early as 3 to 5 days of age fosters positive social interactions, encourages play behavior, and reduces stress-related vocalizations[2,3].** Pairing calves before 6 days of age provides stress-buffering benefits without compromising health or production[4]. Additionally, in group housing systems, introducing calves at 5 days instead of 24 hours can reduce labor associated with training them to drink milk and lower the incidence of diarrhea[5]. However, introducing calves to larger groups (more than 10 calves) at 6 days of age can increase competition for resources and require more assistance compared to introductions at 14 days[6]. **Careful consideration of timing for pairing and grouping calves is essential to optimize social development while minimizing stress and management challenges, but must be done by 4 weeks of age.**

Weight gain

Research consistently demonstrates that calves housed in pairs and groups early in life experience improved weight gain compared to those kept in individual housing. A review of 11 studies revealed a positive benefit of social housing was observed in 8 studies, with none indicating negative effects[7]. **Specifically, the studies showing positive results found that social housing led to an improvement in weight gain ranging from 29 to 150 grams per day compared to individual housing.**



Starter intake

Social housing in early life also positively impacts starter intake in calves. In a review of 11 studies, six demonstrated a clear benefit from social housing, with none revealing a negative effect[7]. In the studies that showed an advantage, **calves in social housing consumed between 32 and 233 grams more starter feed per day compared to individually housed calves.**

Behaviour

Calves raised socially - in pairs or groups - benefit in several ways, including being less fearful and more confident when mixed with other calves later in life. **Social housing also leads to more play behavior (an indicator of good welfare) during milk feeding, better stress management, and improved competitiveness after weaning[7].** Furthermore, socially raised calves show lower heart rates, an indicator of stress, and are more willing to approach unfamiliar calves. They adapt better to new types of feed and perform better in learning tasks compared to those raised alone. Ultimately, the advantages of social housing not only enhance the immediate well-being of calves but also lay a strong foundation for their future success[7].

Health

Factors like maintaining good hygiene, proper ventilation, successful transfer of passive immunity, adequate stocking density, and consistent milk feeding practices are key for managing calf health regardless of housing style[7]. **Research has shown no differences in health outcomes between pair and individually housed calves**; however some research suggests that larger groups (more than 10 calves per group) can increase the risk of illness, particularly respiratory diseases. This is attributed to higher competition for feed access and greater stocking density, which can lead to stress, poorer air quality, and lower environmental hygiene. **Calves in smaller groups (6 to 9 calves per group) have been shown to experience less respiratory disease compared to larger groups, and the levels of disease are not different to individually housed calves.** Therefore, keeping group sizes small can help control disease risk. Maintaining stable groups is also important, rather than mixing calves of different ages or frequently adding new calves, as this has been linked to lower levels of respiratory disease.

Cross-sucking

Cross-sucking, where one calf suckles on another, can be a concern with pair or group housing of calves. Damage to the developing udder, as well as mastitis and milk loss in upcoming lactations, can occur as a result of cross-sucking. Although studies report varying incidences and causes to this behavior, meeting the calf's natural suckling, nutritional, and satiety needs can reduce cross-sucking. This can be accomplished by[7]:

- ✓ Feeding milk in bottles or buckets with a teat instead of open buckets
- ✓ Offering milk more frequently or for longer periods
- ✓ Providing dry bottle teats for calves to suck on
- ✓ Increasing the daily milk volume offered
- ✓ Ensuring that calves are gradually weaned off milk
- ✓ Having access to fresh, good quality solid feed and water

Bedding Management

Providing deep, dry bedding is important to maintain calf health and comfort. Everything starts in the calving area, where recent research shows that **adding bedding more frequently can reduce the risk of the herd testing positive for *Salmonella* Dublin**, an emerging bacterial threat in Canada[8]. In the calf barn, other research found that **adding fresh bedding every 2 to 3 days compared with every 7 or more days cut the risk of diarrhea by 57%[9].**

Clean, dry bedding is essential to keep calves warm and reduce energy needs in cold weather. When calves can fully nest in straw, meaning their legs are hidden, the straw traps warm air around their bodies and lowers their critical temperature, helping them conserve energy and allowing them to better combat disease. A Wisconsin study found that **calves that were fully nested in straw had 30% and 20% lower rates of respiratory disease compared to those with legs visible or only partially covered with bedding while lying down, respectively[10].** Furthermore, having dry bedding or a dry bedding pack is linked to a reduced risk of respiratory disease. Calf health and overall productivity can be enhanced by prioritizing bedding management from calving onwards.

Ventilation in Calf Barns

Proper ventilation is essential for minimizing respiratory disease, especially when calves are housed indoors. Calves do not generate enough heat to create sufficient airflow from thermal buoyancy when there is no wind. While both natural and mechanical ventilation systems can be effective, a combination of natural ventilation supplemented with positive-pressure tubes is often preferred. This type of system provides consistent air movement by delivering fresh and clean air directly to calves. In spring, summer, and fall, opening barn sidewalls can help capture prevailing winds and improve ventilation. Maintaining airflow when there is no breeze through use of fans or other ventilation strategies is also needed to prevent heat stress. Ensuring that controlled airflow reaches calves, even when they are lying down, is crucial to avoid pockets of limited or stagnant circulation. **By maintaining appropriate ventilation year-round, the risk of respiratory disease decreases, which can significantly improve calf health and overall comfort.**

Winter
4-8 air changes/hour[11,12]

Spring and Fall
12-20 air changes/hour[11,12]

Summer
40-60 air changes/hour[11,12]

Stocking Density

Stocking density is the single most important factor influencing air quality in a calf barn, and it significantly affects the quality and moisture of the bedded surface where calves rest. **A minimum of 35 ft^2 (3.3 m^2) of bedded area per calf is recommended[13].** This space allows for better airflow and reduces the concentration of harmful bacteria in the air, which helps prevent respiratory disease.

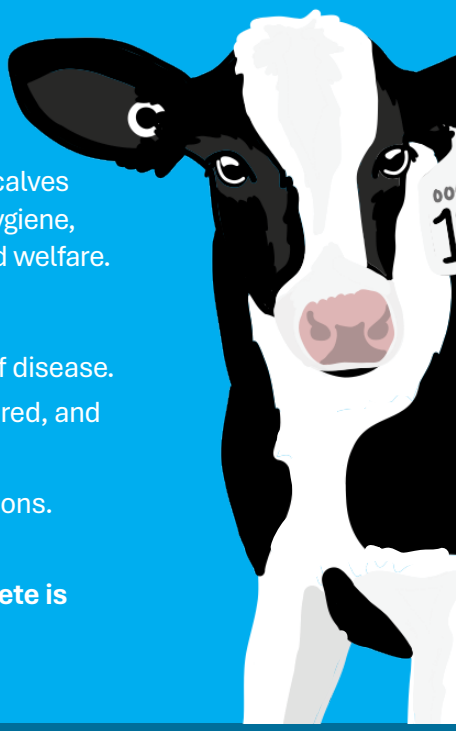
Drainage

Good drainage is essential to manage moisture from urine, feces, spilled milk, and water. **Underneath bedding, calf housing should offer a tiled gravel bed, with a cement base beneath the gravel.** This helps direct excess moisture to an external collection area, reducing bedding needs compared to using solid concrete surfaces. If using only solid concrete, a slope of at least 2% to the pen can efficiently drain liquids from pens. The slope must also prevent water from service alleys from draining into the pen and bedding to maintain a clean environment for calves. **Ensuring that drained liquids do not flow into spaces accessed by calf caregivers is important for maintaining biosecurity.**

Key Takeaways

Proper housing and management of calves has significant impacts on health, welfare, and development. Many studies show that social housing promotes benefits such as increased weight gain, starter intake, and improved behaviors in pair and group housed calves compared to individual housing. Housing calves in small groups, combined with good hygiene, proper bedding, ventilation, and feeding practices, is essential to support calf health and welfare.

- ✓ **Make a plan now** for transitioning from individual to social housing by 2031.
- ✓ **Provide clean, deep, and dry bedding** to keep calves warm and reduce chances of disease.
- ✓ **To reduce cross-sucking,** feed milk using nipples, increase the volume of milk offered, and gradually wean calves off milk
- ✓ **Maintain effective airflow on calves,** following air change per hour recommendations.
- ✓ **Provide adequate space per calf (35 ft^2).**
- ✓ Underneath bedding, **a tiled gravel bed over cement or adequately sloped concrete is important for drainage.**



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