Housing for Preweaned Dairy Calves in the Southeast

Housing can greatly impact the health and growth of a dairy calf. For calves to perform optimally, producers must pay attention to factors that influence feed intake, comfort, and health. Considerations at this stage of a calf's life can have long-term implications for future productivity.

Individual, Pair, or Group Housing

How you choose to house the preweaned calf is likely determined by a number of factors, such as the number of calves, previous experiences, available labor, and facilities. Though there is no longer considered a "right" way to house these calves, there are pros and cons to each system that must be considered to find the best fit for each individual raiser.

Individual Housing

Pros:

- easily assess individuals for feed intake and manure consistency
- reduce horizontal transmission of disease between animals
- effectively prevents calves from cross-suckling

Cons:

- labor-intensive to feed and clean feeding equipment
- potential for more difficult transitions when calves move into group housing after weaning, which may cause a lag in growth

Pair Housing

Pros:

- encourages social behaviors that may increase feed intake, particularly calf starter grain, and ultimately increase growth
- allows social development in a smaller setting where individual calf assessments are more easily achieved than in groups

Cons:

- generally, calf feeding cannot be completely isolated
- dominant calves may consume more than a submissive calf in a pairing

Group Housing

Pros:

- encourages social behaviors that may increase feed intake and ultimately increase growth
- allows for use of mob feeders and the economical use of automatic feeders
- with auto feeders, less time is spent feeding and cleaning feeding equipment; that time may be spent on calf observations and cleaning the housing environment

Cons:

- may increase the incidence of respiratory diseases without proper ventilation
- increased potential for transmission of scour-causing organisms (protozoal, bacterial, and viral), such as Salmonella, Cryptosporidium, coccidiosis, E. coli, and Rotavirus
- cross-suckling may become a problem if calves are not sufficiently fed, which will increase the rates of heifer mastitis
- with the use of mob feeders, sluggish or submissive calves may be negatively affected
- dominant calves may consume more than a submissive calf in a pairing

If choosing pair or group housing, it is recommended that calves are fed individually for a few days following birth to allow them to understand the feeding mechanism, develop an appetite, and build strength and coordination before moving in with other calves. This will also allow for a sense of calf “readiness” before moving into a group to prevent any lags in growth or increased rates of illness. Additionally, as pair and group housing moves against the longstanding tradition of isolation for disease prevention and immune system development, special attention to things like ventilation and bedding is the key to success in these housing systems.

Shelter

The shelter should provide a clean and dry place for calves to live while protecting them from environmental elements. Needs vary based on the type of housing system chosen, the time of year, and environmental conditions, including protection from elements such as rain, wind, and direct sunlight. Examples of shelter may include:

- individual calf hutches
- small group super hutches
- shed or lean-to
- stall or barn area

Regardless of the type of shelter, the goals of the shelter remain the same. These include:

- easy to work in and keep clean
- allows animals to evade environmental factors such as rain, sun, etc.
- well-ventilated and free of drafts
- protects calves from older animals on the farm—this includes no direct access or nose-to-nose contact, and it prevents any access to waste materials of older animals (which might happen if it’s placed downhill from older animals in a barn)

Ventilation

Ventilation is defined simply as the provision of fresh air. It is important to note that drafts and

ventilation are not equivalent, and a draft-free environment is recommended for calves. Commonly caused by temperature variations, drafts are created when air is unintentionally pulled into a space. Conversely, ventilation is intentional and results when fresh air is moved through a space, regardless of temperature difference.

Though often overlooked in calf housing, ventilation provides cooling, regulates humidity and moisture, and reduces odors and pathogens. Ventilation is an important component of the dairy calf's environment to minimize respiratory issues when it's hot or cold outside. Ventilation may be natural, mechanical, or both, and should meet the following recommendations:

Rules of Thumb on Calf Ventilation

Cold weather ventilation provides fresh air while allowing a drying effect on the calf's environment. If you're using hutches or pens, position them in a way to protect them from prevailing winds, thus minimizing drafts.

Hot weather ventilation increases fresh-air movement, which helps prevent warm air from accumulating in the calf's environment. If you're using hutches or pens, position them in a way that utilizes prevailing winds.

Factors That May Reduce Effective Ventilation

Stocking density:

- Animals: Preweaned calves need approximately 30–35 square feet of space per calf. In group housing, calculate the area of the living (not feeding) environment and divide by the number of calves housed.
- Hutches: When hutches are placed too close together or in linear versus staggered rows, airflow may be impeded.

Air obstructions:

- Be aware of shrubs, tall grass, trees, or other impediments to airflow around the calf's living space, especially during warm/hot temperatures.

Bedding

There are many suitable bedding choices for dairy calves. What works on an individual operation is highly driven by environmental factors such as temperature, drainage, labor dedicated to calf care, and accessibility and cost of various bedding materials.

Regardless of the type of bedding, it's critical to ensure it's clean, dry, and comfortable to achieve average daily gains in early preweaned dairy calves, as they spend as much as 80% of their time lying down. Additionally, the type of bedding may differ as the calf ages.

A dairy calf in the early preweaned stage has a high energetic requirement for growth and an underdeveloped immune system, making it highly susceptible to pathogens within its environment. Considerations for bedding include drainage and cleanliness.

Good bedding can drain well, or be maintained to allow the calf access to a dry bedding source.

Avoid wet bedding because it:

- represents a potential bacterial issue
- may increase energy needs for calves in colder climates
- often sticks to calves; calves that self-groom will ingest bedding and bacteria

Clean bedding free of feed, manure, and urine.

Avoid dirty bedding because it:

- increases potential bacterial load and exposure to calves
- can release ammonia when fecal material/organic bedding breaks down, compromising the air quality in the calf's living environment
- decreases the insulating properties of calves' hair coats
- will increase fly breeding grounds and populations

Table 1. Pros and Cons of Various Bedding Types for Calves.

Bedding Type	Pros	Cons
Straw	Relatively inexpensive Stays the most dry of the organic options Easy to handle Can provide insulation during periods of cold temperatures Organic Comfortable	Compacts and has reduced drainage Retains moisture High bacterial loads if not kept clean
Hay	Comfortable Relatively inexpensive Easy to handle Can provide insulation	Organic Compacts and has reduced drainage High bacterial loads if not kept clean Potentially

		during periods of cold temperatures	dusty, which can lead to respiratory issues in poorly ventilated spaces Absorbs more moisture than straw
	Rock	Inorganic Drains well Cools in warm temperatures	Less than ideal comfort Not suitable for cold temperatures Top dressing with organic materials defeats its inorganic and drainage properties More difficult to handle compared with other options
	Sand	Inorganic Drains well Cools in warm temperatures Comfortable	Expensive More difficult to handle compared with other options
	Shavings	Comfortable Easy to handle Can provide insulation	Organic Can be expensive with area and market often

	during periods of cold temperatures	dictating prices Retains moisture Potentially dusty, which can lead to respiratory issues in poorly ventilated spaces

Disinfecting Living Areas Between Individual Calves, Pairs, or Groups

Whether housing calves as individuals, pairs, or groups, it is important to disinfect the living space before new animals enter that environment. Disinfection will reduce the exposure of pathogens to potentially naïve animals and reduce the spread of any pathogenic microbes. This step is an integral part of any farm's biosecurity program.

The steps for disinfecting calf areas before the introduction of new animals include:

1. Remove all organic material to a location away from the calf housing.
    a. This removal reduces the opportunity for reintroduction of anything pathogenic back into the living environment.
    b. Removal also reduces odors and fly populations around calf areas.
2. Disinfect.
    a. Choose a disinfectant that acts broadly, e.g., effective against bacteria, fungi, and viruses.
    b. Follow disinfectant instructions with thorough application to all surfaces a calf comes into contact with, starting with high surfaces and then moving low.
    c. Adhere to the disinfectant's contact time. Failure to do so can reduce its ability to kill pathogens effectively.
3. Rinse.
    a. Following the appropriate contact time, all surfaces must be abundantly rinsed. Residual disinfectant may
    b. irritate calves.
    c. Rinse high surfaces first and move to low.
4. Dry thoroughly.
    1. Drying surfaces reduces the surfaces' potential for harboring water-loving microbes.
    2. Direct sunlight is a great dryer.

If housing animals on earthen ground, it is equally important to understand that the ground may harbor pathogens. Again, clean away all organic material and the top layer of dirt. Though not always feasible, it is ideal to give the ground periods of rest between subsequent calf groups. Ideally, this rest period would include sun exposure, which is a natural disinfectant, and the

cycling of warm and cold seasons to reduce the survivability of pathogens.

Assessment Techniques

A few simple techniques may be used to assess the quality of your calf's bedded environment.

Kneel Test

Kneel on your calf's bedding for a minimum of 20 sec. If your knees get wet, then your calf is exposed to a wet bedding environment. Realize that your calf will spend time seeking out drier parts of their living environment.

Watching calf behavior may tell you where these are located and if other factors of calf housing—e.g., hutch direction, ventilation, and sun exposure—may affect bedding microenvironments.

Nesting Scores

Nesting is important for comfort and temperature regulation, particularly in cooler temperatures. Nesting scores are determined when calves are lying in their bedding and may range from 1–3, with the ideal varying slightly based on environmental temperature (Figure 1).

A nesting score of 1 is when the calf appears to lie on top of the bedding with its legs fully exposed. This nesting score may be appropriate for calves housed during summer, but is insufficient for housed calves in winter. A nesting score of 2 is when the lower legs are not visible, but the upper legs are. This nesting score alone would not be sufficient for winter housing unless calves also have a calf jacket. With a nesting score of 3, the calf's legs are 2/3 covered, which allows them to increase their ability to retain heat. This nesting score is most often achieved with hay or straw as the calf's surface layer.

NESTING SCORE		DESCRIPTION
1		When the calf is lying down, bedding does not cover any part of the foot or leg. This nesting score would be observed in the summer, when the calf is bedded with sand or shavings, but is not appropriate for winter.
2		When the calf is lying down, it is nestled slightly in the bedding. Part of upper leg is visible, and part of the lower leg is covered by bedding. In the winter, this score would indicate there is not enough bedding to nest in, unless the calf is wearing a calf jacket, which can increase the nesting score by 1.
3		Deep straw bedding allows a calf to nest and trap warm air around their body. When calves are lying down, their legs should not be visible. Usually 3 to 4 inches (7.6 to 10 centimeters (cm)) of shavings topped with 12 inches (30 cm) of straw is ideal.

Figure 1. A Visual Representation of Nesting Scores.

Nesting Score 1. When the calf is lying down, the bedding does not cover any part of the foot or leg. This nesting score would be appropriate in the summer, when the calf is bedded with sand or shavings, but is not suitable for winter.

Nesting Score 2. When the calf is lying down, it is nestled slightly in the bedding. Part of the upper leg is visible, and part of the lower leg is covered by bedding. In the winter, this score would indicate there is not enough bedding to nest in unless the calf is wearing a calf jacket, which can increase the nesting score by 1.

Nesting Score 3. Deep straw bedding allows a calf to nest and trap warm air around its body. When calves are lying down, their legs should not be visible. Usually, 3 to 4 in. (7.6 to 10 cm) of shavings topped with 12 in. (30 cm) of straw is ideal.]

Calf Cleanliness Scoring

Assigning a numerical value to calf cleanliness may improve employee attention to dirty calf environments. These dirty environments not only increase the calf's energy

expenditure—causing it to direct energy toward managing its environment and away from its growth—but also increase its exposure to pathogens within the living environment. A simple 1–3 scale was developed (Kellermann et al., 2020) to assess calf cleanliness (Figure 2).

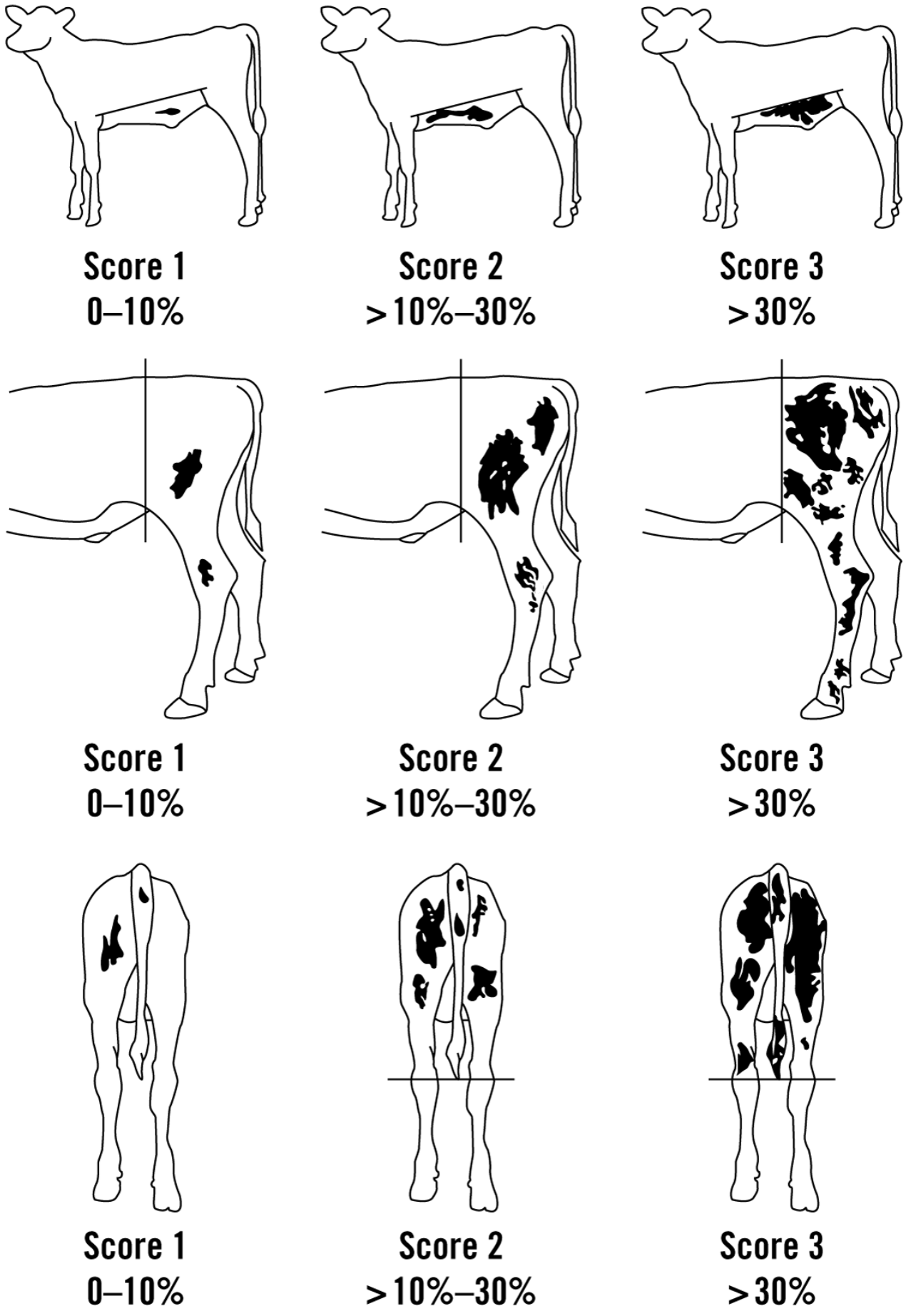

Figure 2. Scoring Chart for Calf Cleanliness.

From “Short communication: Design and validation of a hygiene score for calves,” by L. M. Kellermann, A. Rieger, G. Knubben-Schweizer, & M. Metzner, 2020, J Dairy Sci., 103(4), 3622–3627 (https://doi.org/10.3168/jds.2019-17536).

Conclusion

The future of a herd is found in its calves. Attention to detail during calf rearing allows for optimized growth and performance, which translates into future productivity. Variables that can influence a calf’s ability to perform optimally include housing type, ventilation, bedding, comfort, and cleanliness. Regularly evaluating these variables and modifying them as needed are keys to calf-rearing success.

References

Kellermann, L. M., Rieger, A., Knubben-Schweizer, G., & Metzner, M. (2020). Short communication: Design and validation of a hygiene score for calves. J Dairy Sci., 103(4), 3622–3627. https://doi.org/10.3168/jds.2019-17536