WHILE HUTCHES CAN PROVIDE excellent calf care, following these recommendations for calf barns can create a comfortable environment for calf feeders, too.

Calf barns can equal hutches

With the proper specifications, calves can thrive in a barn environment. Pen space is the number one factor whether calves are grouped or not.

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FOR over 20 years, our University of Wisconsin clinical group has conducted field research and investigated calf health problems in dairy herds across North America. From this perspective, we have developed preferences for calf housing that are associated with improved calf health.

We view the individual calf hutch as being an excellent environment for calf health, but calf caregivers are frequently exposed to brutal working conditions. The adverse outdoor working conditions paired with the developing interest in automatic calf feeders raised interest in improved calf barn designs. Our experience suggests that calf barns can equal hutches as excellent environments for nursing calves.

Recommended for all calf barns

Space per calf or calf pen. Based upon studies of airborne bacterial density, space per calf is the single most important determinant of air quality in a calf barn. We seek approximately 30 square feet per calf, and our experience with facilities of less than 20 square feet per calf has been disappointing.

Bedding in cool weather. The lower critical temperature of a newborn calf is 50°F (10°C) and drops to 32°F (0°C) by 1 month of age. Below these points, it is preferred to provide enough bedding to "nest." In freezing conditions, the bedding should be so deep as to obscure the rear legs of a lying calf. If deep straw is not feasible, good results can be realized with moderate bedding combined with calf blankets.

Drainage below bedding. To maintain a deeply bedded surface, it is critical that the pen has good drainage so that urine, spilled milk and water do not soak the bedding. A preferred feature uses drainage tile below 1.5 feet of gravel which, in turn, is covered with straw, with the tile carrying liquid to a collection area outside of the calf barn. With this base, equivalent beds can be maintained with half the straw.

Natural ventilation with supplemental positive pressure tube ventilation. Natural ventilation has obvious advantages in that natural forces are used to ventilate buildings. However, it has a number of shortcomings, especially in calf housing. Ventilation due to thermal buoyancy is minimal because calves generate so little heat. Sometimes winds do not distribute fresh air well within the barn and still conditions persist about 5 to 25 percent of the time depending on region.

We have developed positive pressure tube systems to move fresh air from outside into the barn microenvironment of the calf without creating a draft. With the widespread success of the tube systems in the last few years, many poorly designed systems have been installed in calf barns that do not achieve these goals.

The supplemental systems consist of a fan to force outside air into a diffusion duct to distribute the fresh air throughout the barn. The fan is selected to provide a theoretical air exchange rate of four air changes per hour in the barn, meeting the minimum winter ventilation rate requirement. In barns with ridge openings and curtain sidewalls, air introduced through the tube finds its way back outside passively. The fan will run nonstop around the clock throughout the year.

The fresh air is discharged from holes in the tube and directed toward the calves. "Throw" distance refers to the distance between the discharge hole to the point where the air is considered to be "still" meaning movement at less than 60 feet per minute. Using mathematical equations, the diameter of the discharge holes are calculated so that still air is achieved a few feet above the calves.

We compared the interior temperatures of two naturally ventilated calf barns located on the same site, identical except that one barn had a supplemental positive pressure system and the other did not. Temperature data collected over a two-week period averaged 23°F for both barns. The barn with the supplemental tube had slightly wider amplitude of temperature of about 2°F colder during the middle of the night and 2°F warmer during the middle of the day.

Low permanent sidewalls in naturally ventilated barns. The base wall below the curtains should be minimal in height and preferably less than 2 feet high. During warm weather, a higher solid wall prevents winds from moving through the calf pens while those same winds travel across the barn above the calves and may prevent air from the positive pressure tube from reaching the calves.

For barns with individual pens

East-west orientation. When individual pens are used, it is critical to orient the barn in an east-west orientation so that individual calf pens are not placed in direct afternoon sunlight. Calves confined to pens along the west wall of a north-south oriented barn have no ability to escape sun exposure in the afternoon.

Limit pen rows to one or two. We have a preference for narrow barns with one or two rows of pens for two reasons. Narrow barns are easier to ventilate by wind forces in warm weather, and it is easier to limit the spread of disease from calf to calf in a long narrow barn. In barns with three or more rows, vulnerable calves of one age are always in the vicinity of calves that are 20 days older and potentially shedding pathogens. For large dairies, multiple smaller "all-in, all-out" units are preferable to large single barns.

Solid side panels with mesh panels on front and rear. In a 2006 field trial, we found that the prevalence of respiratory disease in calf barns was reduced with a solid panel between each calf. While panels reduced the risk of respiratory disease, the panels made ventilation more difficult. Our optimal calf pen has solid side panels and mesh screens in the front and rear. The rear panel can be solid to a height of up to 2 feet to provide a barrier for the calf in cold weather.

Individual calf pens should not be covered but spaced 3 feet from outside walls. A cover is associated with tremendous growth in total airborne bacteria counts in the pen. While a cover can prevent drafts of cold air falling from open eaves into the pen, it also ensures that the air quality below the cover will become very poor. Neither the draft nor the covers are good. The best solution is to separate the pen from the outside wall by about 3 feet. If this space is not available, a positive pressure tube system to provide four changes of air per hour will ventilate the pen sufficiently and allow for closure of the openings on the windward side.

More than the facility

In addition to good housing, caregivers must emphasize colostrum, appropriate amount and quality of milk or replacer, and early disease detection to achieve consistent success.

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SERIES ON CALF BARN DESIGN

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