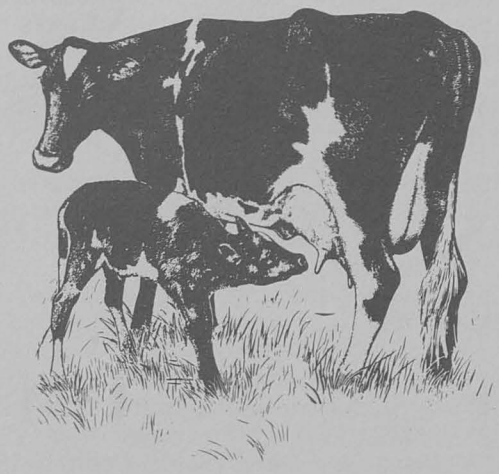
Extension Folder 577
DAIRY CALF AND HEIFER
CORRESPONDENCE COURSE

Unit 4—Dairy Calf Housing and Environment

Purposes

- Understand the principles of maintaining a healthy calf environment.
- Apply these principles to a specific farm situation to develop a healthier calf environment.
- Know where to get further information appropriate to the situation.



Agricultural Extension Service • University of Minnesota

PRINCIPLES OF MAINTAINING A HEALTHY CALF ENVIRONMENT

Proper environment is vital in raising healthy calves. Genetic potential of dairy cattle often is not realized at maturity because of calfhood diseases. Respiratory disease (pneumonia) can destroy enough lung tissue to permanently reduce lung capacity. This lung destruction limits the animal's growth and its milk production at maturity.

The proper environment for healthy calves includes a dry, draft free, sanitary building with a relatively uniform temperature. Let's take a close look at these four essential components of calf housing.

THE DRY BARN

Moisture in the calf barn is deadly. Moisture reduces the calf's ability to keep itself warm. Also, moisture particles provide disease organisms with a "free ride" from sick animals to healthy ones.

Calves are often born in the building that houses the milking herd. As a result, the newborn (nonimmune) calf is immediately exposed to many diseases carried by the older cow. A second exposure, with even greater potential damage, results from *nose-to-nose contact* when calves of various ages are kept in a common pen.

Calf pens also are often located in the same barn that houses the milking herd. Such pens are usually damp, drafty, cold, crowded, and poorly ventilated. The lower temperature is a consequence of the fact that calves, being small animals, give off little heat. This in turn is the cause of dampness in the pen area.

Ventilation—In an attempt to overcome the low temperature and moisture conditions, ventilation fans often are located over calf pens. This fan location only makes matters worse because the calves are then exposed to a concentration of contaminated air from older animals housed in the facility. Disease organisms carried on moisture particles in the air are always present to infect the calves. A fundamental principle of ventilation is that *airflow should always be from the younger animals toward the older animals.*

Exhaust Fans—Continuous exhaust at a minimum of four air changes per hour will eliminate moisture and many disease problems. Remove this air from approximately 15 inches above the floor through a duct built around the fan (or fans). Air near the floor is 6 to 10 degrees cooler than air near the ceiling, but contains essentially the same amount of moisture as that near the ceiling. The duct should be one foot deep and as wide as the fan frame.

Avoid Intermittent Fan Operation—Intermittent operation of fans having a higher capacity is *not* recommended. Intermittent fans use an internal timer or thermostat to substitute for the lower continuous capacity. Though intermittent operation may sound like a good idea because it permits the use of fewer but larger fans, it brings about a wider variation in conditions within the building that may cause undue stress on the animals. Variable-speed fans are not recommended to supply the minimal continuous

airflow because a strong wind may overcome the fan and actually blow air through it back into the building when the fan is running at low speed.

Placement of Fans—Placement of the exhaust fan is important. Air should always flow from the younger animals toward the older animals. This will prevent contaminated air from older animals from reaching the susceptible calf. Therefore, do not locate exhaust fans over the calf pens. Exhaust fans should be located at the end of the barn housing the older animals.

During the summer months barns often get too hot. An exhaust capacity of at least 30 air changes per hour will solve this problem.

Ventilation of Calf Manure Storage—When there is manure storage beneath the floor, as in slat floor units, exhaust should be continuous from the storage pits. This should be at the minimum rate of four air changes per hour. Additional thermostatically controlled pit fans are required to exhaust up to one-half of the total capacity of the system. All pit fans should be in operation before any wall fans are started to ensure increased removal of pit gases. Wall fans are intended to prevent the build-up of animal heat in summer. They are the last to be turned on and the first to be turned off.

Fan Maintenance—Ventilation fans, like other pieces of mechanical equipment, need periodic maintenance. Usually the bearings are permanently lubricated, but regular inspection and cleaning of the fan blades and particularly the shutters is essential. Accumulated dirt greatly reduces air output and, as a consequence, there will be insufficient airflow through the building.

Manure pit fans are constantly exposed to corrosive gases, which cause more rapid deterioration of metal than is the case with wall fans. Thus, earlier replacement may be necessary.

THE DRAFT-FREE BARN AND THE FRESH AIR INTAKE SYSTEM

Harmful drafts in the barn in winter are often the result of a poorly designed ventilation system. One of the most frequently overlooked parts of a ventilation system is the fresh air intake.

The primary function of a fresh air intake system is to distribute incoming air uniformly through the building in a manner that will not cause harmful drafts. This is best accomplished by bringing a small amount of air in at many places. Cold will be felt at the point of entry regardless of the inlet system design unless heat is added to the incoming air. When cold incoming air is warmed, its moisture-holding capacity is greatly increased, enabling this air to absorb moisture produced by the animals and carry it out through the exhaust system.

The air replacement process also allows clean air to mix with airborne disease organisms given off by sick and recovered carrier animals, thus improving air purity.

The Slot Air System—The slot inlet system is a continuous opening to the attic at the junction of the ceiling and the walls, except for a distance of four feet on either side of the wall exhaust fans.

Two capacities for the slot system are required. For winter, a slot opening ¾ inch wide is needed the full length of both long walls. This allows for nearly uniform air entry throughout the barn.

For summer, the slot along the wall opposite the fans is made two inches wide and has a slide for restricting the width to ¾ inch in winter. This wider slot is placed on the north or east side and allows entry of air from the shaded side of the building from a continuous opening beneath the eaves. With a slot air system, continuous exhaust is necessary to prevent backdraft into the attic. Continuous exhaust is a must from the disease prevention standpoint.

The slot inlet system has proved to be an efficient and low-cost way of bringing fresh air into any mechanically-ventilated livestock housing unit. More than 25 years of experience indicate that there is no system that will perform better than the slot inlet for admitting fresh air.

It would seem that little can go wrong with a slot inlet system, but the slot openings often become plugged with debris, blocking air entry to the slot. When fine screen covering the louver and eave openings becomes plugged, it blocks air entry to the attic. The best cure for this problem is to replace the screen with that having ½ inch mesh. Also, the slot openings may be partially obstructed by the ceiling vapor barrier when improperly trimmed at the time of construction.

The slot inlet system is fully explained in the folder, *Insulated Calf Barn with Individual and Group Pens.* If you wish a copy, please check the reference listing on the return form.

Positive Pressure Systems—In positive pressure systems, large quantities of air are forced into the building by intake fans at only a few locations. With this system, it is more difficult to maintain uniform temperature conditions in cold weather. Since the building is under pressure, the warm, moisture-laden air will escape through any available openings in the shell of the building. The end result is moisture and condensation in the walls in cold weather.

THE SANITARY BARN

Many deaths are caused by an unsanitary barn, but the greatest losses are due to nonfatal respiratory diseases of calves, especially to pneumonia. Calves infected with pneumonia suffer lung damage, which limits their growth and reduces milk production at maturity. The dairyman must eliminate pneumonia if his animals are to realize their full genetic potential.

Maternity Quarters—Good calf health begins with sanitary maternity quarters. Preferably, freshening pens should be located outside the milking barn. This will prevent the nonimmune calf from being exposed to mature cows that may be disease carriers. An alternative is to separate them from the main barn with a tight partition and supply a separate ventilation system for that area.

For reasons of construction and management, however, freshening pens usually are located in the barn with the milking herd and share the same environment. In this case, it is essential that the ventilation system be planned so that air movement is from the freshening pen toward those stalls occupied by the milking herd. To accomplish

this, locate exhaust fans away from the freshening pens. Where a solid wall is not practical, a solid partition four feet high is recommended on the sides of freshening pens adjacent to permanently occupied cow stalls.

Calf Pens—Pneumonia is easily spread between calves kept in a common pen; therefore, calves should be kept in individual pens for the first 21 to 30 days in life. A pen 2 by 5 feet is a good size. After 21 to 30 days, calves may be transferred to a common pen, but avoid overcrowding. Allow 24 square feet of floor space per calf—a 10 by 12 foot calf pen should house no more than five calves.

UNIFORM TEMPERATURE

One of the big difficulties for Minnesota dairymen is to provide a dry, draft-free dairy building while maintaining a reasonable temperature. This is especially true in the northern half of the state.

In many cases, it is nearly impossible to provide satisfactory ventilation in older dairy barns that are poorly insulated, perhaps having stone or concrete walls, single windows, and loose fitting doors. All these situations add to the problem of maintaining a uniform temperature and dry environment. Add Minnesota's extreme temperature changes and a very difficult situation is created.

Tightening Up and Insulating—As with any home, tightening up and insulating a barn can be of some help. Loose-fitting doors should be rehung or replaced. Storm windows can be applied.

Adequate insulation is a must. Walls should be insulated to R-15. The ceiling should be flat and insulated to R-23. This means six inches of insulation in the ceiling. If you are interested in further information on insulation, check the return form for *Home Insulation and Heat Loss.* It has an excellent explanation of R values and describes a variety of insulation materials.

All insulation should be protected by a vapor barrier. Vapor barriers should be placed on the warm inside of walls to prevent moisture from entering and condensing in the walls. Four to six mil polyethylene vapor barrier will be satisfactory.

The Warm Barn—In heat-deficient buildings such as calf barns, supplemental heat may be needed during the cold weather.

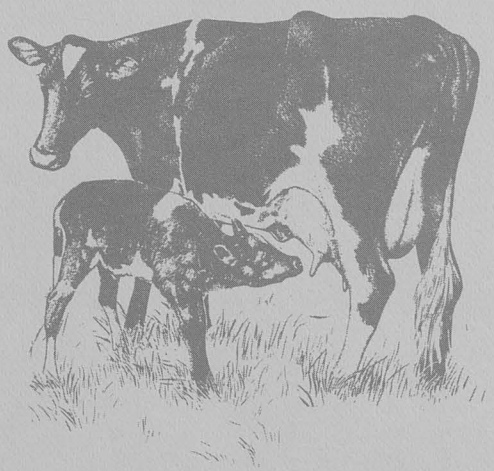
The amount of supplemental heat required is the amount necessary to permit continuous exhaust with at least four air changes per hour and to maintain inside temperature at approximately 50° F. Ideally, supplemental heat should be added to the incoming air and distributed through the building in correctly designed ductwork. Air should not be recirculated through the heat source.

Supplemental heat can be provided by using a hot water or hot air furnace, outside air make-up heater, or electric space heater. Experience has shown that electric space heaters made for specific use in livestock buildings are easy to install and relatively trouble free. A five kilowatt unit will produce approximately 15,000 Btu's per hour. The number of electric heater units required will depend upon the size of the particular building.

Generally, when supplemental heat is used, only the continuous fan operates and the temperature control is on the heater. During periods of high outside humidity, usually in the fall and spring, it may be necessary to increase the airflow rate for odor control and, at the same time, operate the heater to reduce relative humidity. During this condition of operation it is necessary to control the heat supply manually. Careful management is essential for successful performance of the ventilation system.

Calf Hutches—A low cost alternative to a separate calf barn is the use of calf hutches as discussed in *Building and Managing Calf Hutches,* Agricultural Engineering Fact Sheet No. 24. You can build them from the plan shown at a relatively low cost. Should you be experiencing high death loss or chronic sickness in your present calf housing facilities, the immediate use of calf hutches can be a quick solution to your problem. Proper nutrition and management as described is essential to success.

Building a New Calf Barn—One solution to calf health problems may be to move calves out of their present housing and into a separate calf barn. For those considering such a building, please check the enclosed return form to receive a brochure titled, *Insulated Calf Barn with Individual and Group Pens.* This plan discusses in detail convenient arrangements, ventilation, supplementary heat, and the plans for the layout and design of such a building.



Dairy Calf Housing and Environment

Please Fill Out and Return

Name_____

Address_____ County_____

1. Where do you now house your calves?

2. Describe the ventilation system in the building in which your calves are housed.

3. Air should flow from the calves to the older cows. Are your exhaust fans placed so this will happen? Yes____ No____

4. Is there a continuously running exhaust fan? Yes____ No____

5. How long has it been since you inspected your fans to see if the shutters are clean and operate freely?

6. Describe the fresh air intake system.

7. Is supplemental heat used? Yes____ No____

8. If yes, how is it supplied?

9. Are the walls and ceiling dry in the calf pen area in winter?

10. Are the calves kept in community pens where they have direct access to each other following milk feeding?

11. In reviewing your own calf housing program, what problem areas do you find?

over

12. After reading this material and from your own judgment, what might you do to alleviate these problems?

13. What questions do you have?

The following material is also available on request. Please check those publications you would like to receive.

☐ *Insulated Calf Barn with Individual and Group Pens,* M-Sheet 149
☐ *Building and Managing Calf Hutches,* Agricultural Engineering Fact Sheet 24
☐ *Home Insulation and Heat Loss,* Agricultural Engineering Fact Sheet 18
☐ *How to Plan a Mechanical Ventilation System for the Dairy Barn,* M-Sheet 128

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