Farm Structures
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture and Food

Order No. 326.300-1

DAIRY CALF HOUSING

INTRODUCTION

One out of every five dairy animals in the milking herd must be replaced each year by a heifer calf to maintain herd size and to keep productivity high. Often the housing facilities used for raising dairy replacement calves is the poorest on the farm. The most critical period in raising a calf is in the first six weeks of its life. The environment, in which it is raised, has a strong influence on its health and rate of growth. Almost any housing arrangement is suitable provided it is clean, dry, free of drafts and efficient for the caring of the animals.

CALF HOUSING REQUIREMENTS

Regardless of the numbers of calves and whether they are raised or purchased, housing requirements are basically the same. Good calf housing facilities should:

- Be in a completely separate area, away from the main dairy housing barn and be ventilated independently.
- Have pens that are clean, dry, free from drafts and amply lighted. Optimum conditions for calves are a temperature of 50 to 60º F and a relative humidity of 65 to 75%.
- Provide convenient storage for feed, bedding and supplies.
- Be constructed of durable and easily cleaned materials especially in the area where the youngest calves are housed.

FEEDING FACILITIES

Feeding and watering facilities in calf houses should be sturdy and easily cleaned. To minimize feed wastage, convenient access and ample feeding space are desirable features. The feeding area should be clean and dry both to aid in the overall sanitation and for operator comfort.

UTILITY AREA

A service and utility area should be provided in close proximity to, and within easy access of, the calf housing area. The utility area is used to mix and prepare feeds, to clean feeding utensils, store supplies and should include most or all of the following facilities:

- Hot and cold water under pressure.
- Drain facilities connected to an appropriate disposal facility.
- Wash tubs or sinks for washing and sterilizing feeding and watering utensils.
- Drain and storage racks for utensils.
- Cabinets for storage of supplies.
- Refrigerated storage for pharmaceutical supplies.
- Frozen storage for colostrum.

TYPES OF HOUSING FOR DAIRY CALVES

Housing for calves may be classified as one of three types. Each type has particular advantages and disadvantages, some of which may be related to specific climatic conditions or management capabilities of the operator.

Cold Housing

In this type of housing, calves are protected from rain, snow, winds and drafts but the building is not tightly closed, is not insulated and depends upon natural ventilation. Access to outside pens frequently is provided.

Cold housing facilities can be constructed at lower costs but require more labor, bedding requirements are greater and calf performance may be affected during periods of extremely cold weather. Calves can stand low temperatures provided they are protected from the elements and their pens are kept dry. When calves are young or when temperatures are cold heat lamps or infrared heaters may be used.

Cold Modified-Environment Housing

With this type of housing, calves are confined in a tight insulated building. Supplemental heat is not provided. Inside temperature is maintained at 5- 20º F above the outside temperature and fluctuates with it. Mechanical ventilation must be provided.

Cold modified-environment housing may have particular advantages in the milder regions of the province such as the Fraser Valley and Okanagan. In these regions, the temperature of insulated calf barns usually can be kept above freezing without supplemental heating. Frequently, these barns have had problems with calf health and performance, largely because of insufficient ventilation resulting in damp unhealthy conditions. Mechanical ventilation is required in insulated calf barns for moisture removal during the winter and for heat removal during the summer. **Do not house calves in tight insulated buildings with no mechanical ventilation.** Extreme caution should be exercised when ventilating cold barns to ensure that drafts are not produced. (See Plan No. 321-27)

Warm Controlled-Environment Housing

Calves are confined in a tightly closed, insulated building where supplemental heat and mechanical ventilation are provided to maintain an optimum environment.

Warm controlled-environment housing represents a significant investment in terms of the heating and ventilating equipment. However, by maintaining an optimum environment, calf performance should be improved and losses kept to a minimum. Labor, bedding and feed requirements also are reduced with warm housing and animal density within the building can be increased. As in the case of cold modified-environment housing, adequate mechanical ventilation is essential.
(See Plan No. 321-26)

VENTILATION OF CALF BARNS

Poor or inadequate ventilation can be blamed for many calf deaths. Adequate ventilation often is a problem, especially in cold modified-environment calf houses.

Ventilation of a livestock building is required to:

■ Remove Excess Moisture

Moisture produced in a calf house, if not removed by ventilation, creates damp and humid conditions. When its hair coat gets damp and loses its insulative value, the young calf cannot maintain thermal equilibrium and can literally be chilled to death at temperatures considerably above freezing. If, on the other hand, humid conditions in the calf house are not permitted to develop and the calf's hair coat remains dry, the calf can be comfortable at temperatures considerably below freezing. Besides upsetting the calf's natural insulation, high relative humidities may promote the survival of bacteria by permitting them a place to live in suspended water droplets. A good ventilation system will remove moisture produced by the animals without creating drafts.

■ Remove Excess Heat

Especially during the warm summer months, the heat produced by livestock within an insulated building may cause excessively high temperatures and uncomfortable conditions. Air movement provided by ventilation often is all that is required to reduce the temperature to a comfortable level. In extreme cases, supplemental cooling, such as by evaporative cooling pads, may be advisable.

■ Replace Stale Air

Air inside livestock buildings becomes contaminated with carbon dioxide, ammonia and other gases. The concentration of gases such as ammonia and hydrogen sulfide may be minimized by good management and proper sanitation but other gases resulting from animal respiration must be removed by ventilation. Insufficient ventilation

resulting in the buildup of these gases in the air inside the calf house can reduce calf performance and increase the susceptibility of calves to respiratory diseases.

A good ventilation system, then is one that removes excess moisture and/or heat and provides sufficient fresh air to replace stale air without the creation of drafts.

Ventilation Rate

Ventilation rates normally are given in terms of cfm (cubic feet per minute) per animal. For calves from 100 to 200 lbs, the recommended ventilation rates are as follows:

Outside Temperature ° F	Ventilation Rate (cfm / calf)
Very cold (-10° F or less)	4 – 8
Cold (-10° F to +20° F)	12 – 16
Mild (+20° F to +50° F)	30 – 50
Warm (over +50° F)	120

The ventilation rate during cold weather is based on moisture removal and during warm weather is based on temperature control. The ventilation rates in the table apply only when the building is completely populated. For low density or partially filled calf houses, the minimum ventilation rate required can better be calculated as 4 complete air exchanges per hour. (The volume of the room or of the building equals 1 air exchange.)

Ventilation Systems

The two most common ventilation systems for calf houses are the exhaust (negative pressure) system and the pressurized (positive pressure) recirculation system. The exhaust system consists of a fan or series of fans used to draw stale air out of the building. Fresh air enters the building through a system of controlled air inlets. The exhaust system is less expensive, requires fewer controls and is simpler to install and operate.

With the pressurized ventilation system, one fan draws fresh air into the building and circulates air within the building while a second fan exhausts the required amount of air. The pressurized system is especially useful where a calf unit is built or exists within a larger building. (ie. a room isolated inside an old stanchion barn)

The main factor affecting air distribution and circulation within a calf unit is the placement and design of the inlets. A suitable inlet for a calf barn with an exhaust-type ventilation system is shown in Figure 1. (Plan No. 306-48)

Ventilation Control

Exhaust fans must be sized to produce the correct ventilation rate under all expected outside temperatures. To obtain the desired flexibility, a number of single or two-speed fans are recommended. The minimum ventilation rate can be obtained by a single fan operating continuously in larger barns, but in small calf units, a timer may be required to turn the fan on for only a few minutes of each hour. Use of fans that are too large should be avoided. Large fans can result in sudden and extreme fluctuations in temperature each time they come on. Higher ventilation rates required during mild and warm weather should be controlled by thermostats. Likewise, supplemental heating should be controlled by thermostats. Care must be taken when designing a system with supplemental heat to ensure that the fans and the heater do not work against each other. **Humans should not be depended upon for regulation of fans or heaters as they are not usually around when adjustments become necessary.** A small investment in switches, thermostats and timers may well pay off in terms of a few calves saved by proper ventilation.

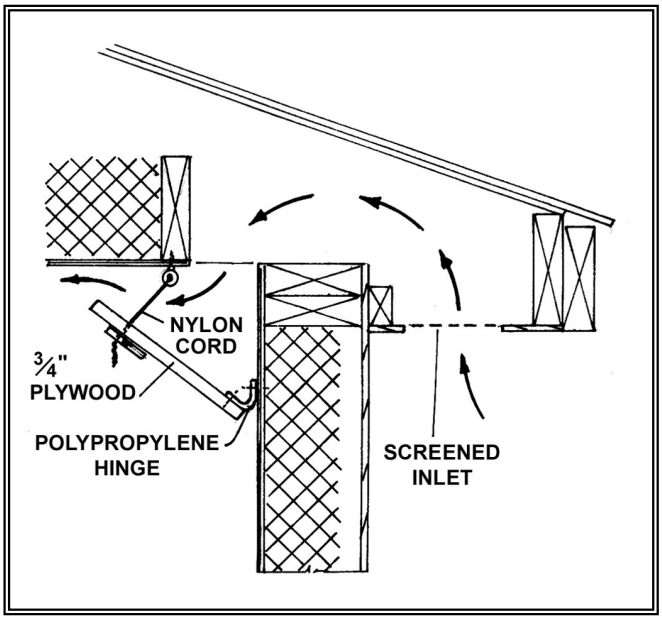

Figure 1 TYPICAL AIR INLET (Plan No. 306-48)

Supplemental Heat

Under certain conditions of low outside temperatures and high humidity, the small calf cannot produce enough heat to remove the moisture it produces. Supplemental heat may be provided in tightly closed, insulated buildings to reduce temperature fluctuations inside the building. Heat can be supplied electrically with hot water or with oil or gas-fired space heaters. Oil or gas heaters must be properly vented to the outside. For further information on designing ventilation and heating systems, contact the Ministry of Agriculture and Food, Resource Management Branch.

PENS AND HOUSING ARRANGEMENTS

Young Calves

Young calves from birth to weaning age are best kept in individual stalls. The main reasons are:

- To control suckling - suckling can introduce bacteria into young heifers' udders that can cause problems later in life.
- To control spreading of disease - individual calves can be isolated from the other calves if disease becomes a problem.

Where individual stalls are used, they should be easy to clean and to move. In some cases, they may be portable and expandable. In all cases, they should be sized according to the calves they are intended to accommodate and should be arranged to facilitate convenient feeding and cleaning.

If individual stalls are not available and calves must be kept in group pens, the calves should be tied during and for a short while after feeding. Placing some dry feed in the bucket after feeding may help to discourage sucking, as well.

Some operators use automatic milk replacer dispensers for feeding calves in group pens. Group pens with automatic nursing units can save considerable time in larger herds but disease transmission can be a problem. If used, these machines must be constantly checked to ensure that the machine is operating properly and that all calves are getting their turn at the machine.

Individual Stalls

The most common type of individual stall used in small calf-raising operations is the floor-level bedded stall (Figure 2). Calves usually are not tied in these stalls. Although earth floors may be used, hard-surfaced floors are preferred for reasons of ease of cleaning and lower labor requirements. In all stalls, sufficient dry bedding must be maintained within the stall to absorb the liquid wastes and keep the calf's bed dry.

Many sizes and types of bedded floor-level stalls have been used. They vary in size between 15 and 25 square feet per calf, with an optimum being 20. (4' x 5') The partitions between adjacent individual stalls should be solid to prevent calves from sucking each other and, in cold barns, at least three and preferably all four sides should be solid to prevent drafts.

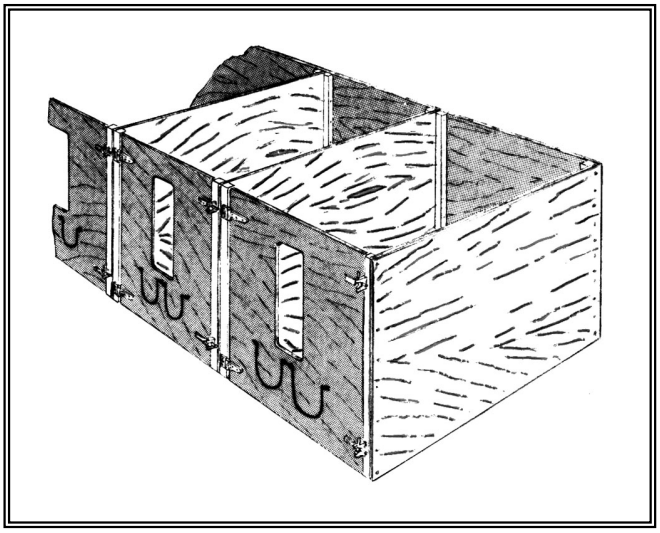

Figure 2 INDIVIDUAL FLOOR-LEVEL BEDDED STALL

(**Plan No. 326-35**)

Also to prevent sucking, the walls between pens should be at least 40 inches high.

Soiled bedding should be removed from the pens and fresh bedding added as often as necessary to maintain a clean, dry bed. Cleaning these calf stalls is a manual job but can be made easier in a properly designed calf house with convenient cleaning alleys and conveniently located bedding storage.

Elevated Stalls

Elevated stalls have been popular with producers raising large numbers of calves because of the substantial saving in time spent cleaning calf pens and the lower building costs due to the higher animal densities that are possible. **Elevated stalls should be used only in tightly closed, insulated buildings**. Their use in cold barns is not recommended because of problems in controlling drafts.

Elevated stalls with no bedding are used in some calf barns. Manure falls or is flushed through the slotted floor into a gutter and is then flushed or scraped to a liquid collection tank. Alternatively, the manure is diluted and stored in a larger gutter beneath the stalls. This method of housing can result in several problems. These include:

- Gases released from manure stored under the slats may be a factor causing respiratory troubles in calves.
- Indiscriminate use of the hose while cleaning stalls and flushing the gutter can get the stalls, the floor, the walls and the calves wet.
- The increased use of water places an extra load on the ventilation system that is depended upon to dry out the building.

A better method of operating elevated stalls involves the use of bedding in the stalls to aid in calf comfort, to reduce air movement (drafts) through the stall floor and to soak up water. Manure from this type of operation can be handled with conventional solid manure handling equipment.

Weaned Calves

Calves that have been kept in individual stalls normally are moved after weaning to group pens or free stalls. Grouping can reduce the labor required to feed and keep calves clean and usually reduces the building costs as well. Once past the critical preweaning stage, calves can be housed quite adequately in cold barns.

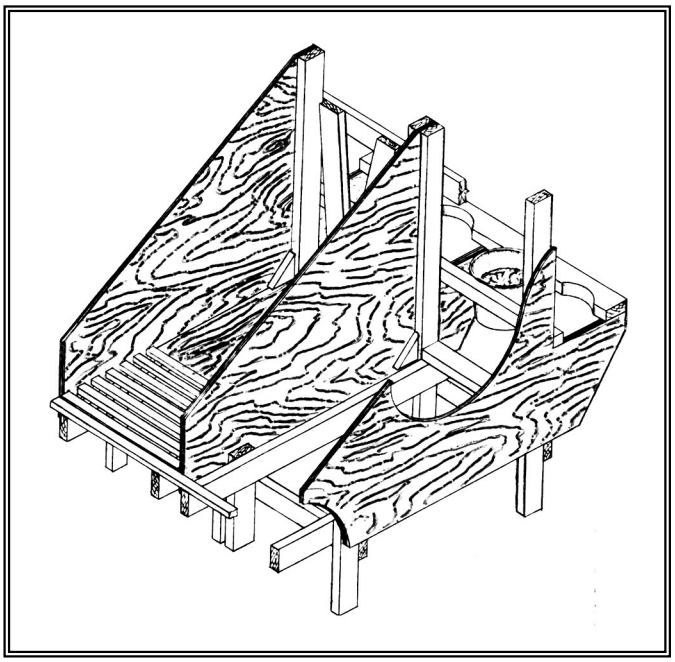

Figure 3 ELEVATED CALF STALL (Plan No. 326-33)

Grouping of calves should be on the basis of size and age. As an example, calves between the ages of 3 to 6 months can be divided into groups of 8 to 10 animals per pen. Each calf in the group should have 20 square feet of bedded space and 12 to 16 inches of feeding space. Crowding, as a result of the pens or the bedded area being too small or insufficient feeding space, can impose severe stress on individual calves and can contribute to digestive upsets and scours.

Free Stalls

Free stalls can be used successfully to raise calves from weaning age onward. The major advantage of free stalls over group pens is a saving in bedding and increased efficiency of manure removal. Larger groups and greater age differences can be tolerated with properly planned free stall facilities. Grouping is necessary, however, to match stall size with the size of the calf and to permit the feeding of different rations.

Group housing facilities should be planned to minimize hand labor. Feeding in these barns can be made easier by the use of central or drive-through feeding alleys. Hay and bedding can be stored in the same building for easier handling. A barn cleaner to remove manure from the barn and into storage can be useful especially in colder climates as doors do not have to be opened during the cleaning operation. (See Plan No. 321-25)

Sanitation and Disease Control

Proper housing facilities, a good feeding program and sanitary management practices will go a long way towards ensuring the calf is strong and healthy. A few simple sanitary measures will aid in reducing disease problems. These include:

- All calves should be housed in clean, disinfected stalls or pens. After a calf is removed from a pen and prior to refilling, the pen should be thoroughly scrubbed and disinfected with steam or a commercial disinfectant such as creoline or Lysol.
- A once or twice yearly vacancy period in the calf unit should be arranged to allow thorough cleaning and disinfecting.
- Use individual calf pails and keep these pails clean.
- Control flies in the calf house. Manure must not be allowed to accumulate, especially during the fly breeding season. Keep ventilation inlets and windows screened at all times. Consult your local agricultural office for advice on a suitable program of insecticide spraying.
- Isolate calves immediately if pneumonia or scours develops. Before a serious problem occurs, consult your veterinarian.

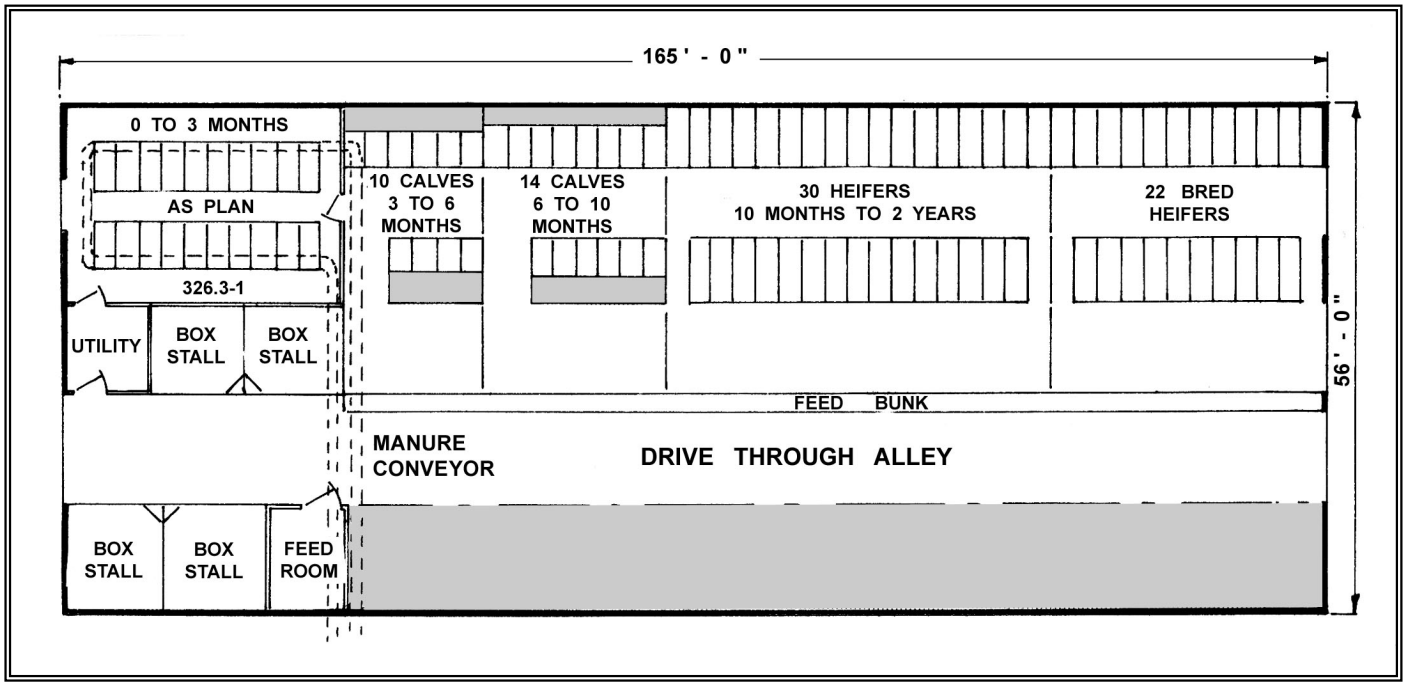

Figure 4 **FLOOR PLAN SHOWING ACCOMMODATION FOR ALL REPLACEMENT ANIMALS FOR A 100 COW DAIRY OPERATION**

(Plan No. 321-25)

For further information on related topics, please visit our website
Resource Management Branch
www.agf.gov.bc.ca/resmgmt
Linking to our
Publications and Conceptual Plans

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