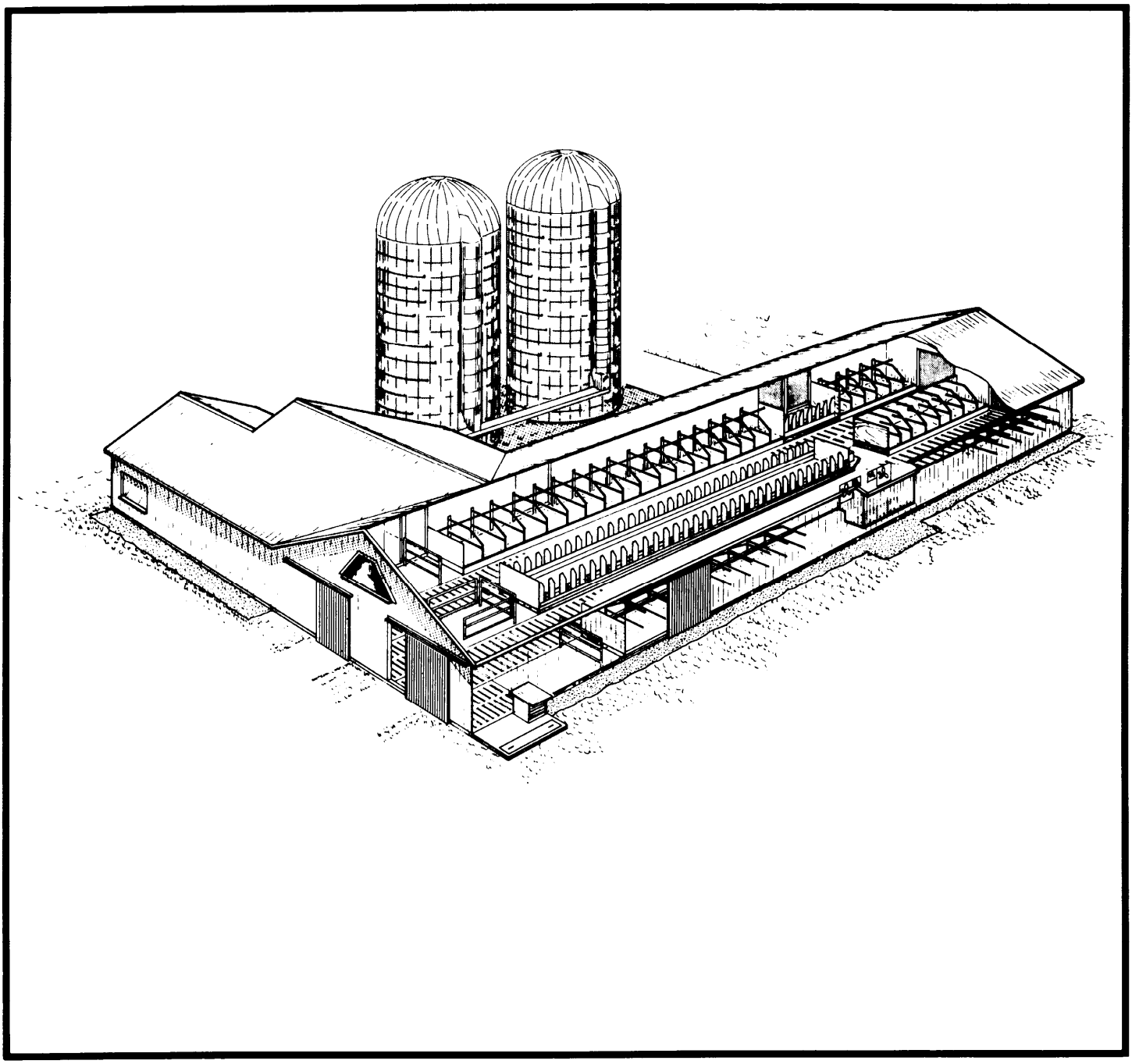
PLAN

2102

FREE STALL DAIRY SYSTEM - SLOTTED FLOORS



CANADA PLAN SERVICE

The Canada Plan Service prepares detailed plans showing how to construct modern farm buildings, livestock housing systems, storages and equipment for Canadian Agriculture.

This leaflet gives management information and describes one of these detailed plans. To obtain a copy of the Canada Plan Service detailed plan, contact your local provincial agricultural engineer or extension advisor.

FREE STALL DAIRY SYSTEM -SLOTTED FLOORS

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This is a detailed plan set showing a free-stall dairy barn 40 x 136 ft to house a milking herd of about 60 cows; an optional wing can be added to either double the herd to 120 cows (40 x 116 ft), or to house dry cows and bred heifers normally required to maintain a 60-cow milking herd (40 x 74 ft).

The extra wing may be added at first or later, but be sure to plan for later expansion even if the extra wing is not required immediately. This wing is of similar construction and detail to the milking herd area except that the free stalls may be made slightly narrower for heifers. Both wings can be fitted into a compact 40-ft clear-span barn, since with slotted floors there is no need to provide extra space for a tractor and scraper to move among the cattle.

Milking system

The milking center is attached at the side of the main barn to allow for expansion. A double-4 herringbone milking parlor is shown (Plan 2501); this is best for one-man milking, although other milking parlor types could be used. The milking center is located adjacent to a cow holding area across the width of the barn. This holding area is sized to hold mound 52 cows at the start of milking; the 8 additional cows would go immediately into the milking stalls at the start of milking. A mechanized crowding gate is recommended for the holding area; this gently pushes cows towards the parlor entrances and makes milking a smooth one-man operation.

Construction and

Natural ventilation might be suitable for especially mild areas such as the tower Fraser Valley of British Columbia or south western Ontario, but for most of Canada the fully insulated construction with fan ventilation is recommended.

Walls are framed on pressure-treated square poles spaced at 8-ft centers; between the poles, horizontal 6-in, planking is fitted to support the claddings and provide enough space for full R-20 friction-fit insulation. This construction has several advantages over conventional concrete foundation and stud frame walls, such as better windstorm resistance and faster construction (especially important when building in bad weather).

The roof is framed with clear-span trusses usually spaced at 4-ft centers; build Canada Plan Service trusses, or see your truss supplier for a suitable 40-ft prefabricated truss designed for this spacing and the snow loads expected in your area. Cover the roof with metal on 2 x 4 in. strapping, nail the ceiling on a grid of 2 x 3-in. strapping spaced at 4 ft centers both ways, and insulate the ceiling from above with R-20 insulation or better.

For ventilation, an adjustable swing baffle controls airflow from a long slot at the center of the ceiling. The plan gives a schedule for fan capacities and stepped thermostat settings to automatically handle the full range of weather from winter cold to summer heat; the only regular adjustment required is to set the openings of the adjustable ceiling air inlet to correspond with the weather expected and the fan capacities for that weather condition. For example, to prevent drafts in cold winter weather, adjust the inlet to 1/8-in. to maintain at least 800 ft/min inlet air velocity across the ceiling when the step 1 fan is ventilating; when the second thermostat starts the next fan, the ventilation rate will almost double, and the ceiling air inlet will allow this increased flow without any adjustment. However with milder weather, the step 3 fan will also operate occasionally, the inlet must be opened to 3/8-in., and so on.

The plan shows a separate inlet over the cow holding area; this allows for extra ventilation for this area when cattle are crowded in for milking during hot weather.

Four-step ventilation is shown for year-round housing. If cattle are pastured during hot weather or if the big sliding doors can be left open all around for natural wind ventilation in summer, the biggest step 4 fans and their corresponding controls could be omitted.

Feeding system

A convenient feed room can be built on the side of the milking center, or on the side opposite the milking center. From there, an overhead feed conveyor (or conveyors) leads through the attic space to a central feed bunk with mechanical bunk conveyor. This feeds silage, concentrates and chopped hay if required. Choose one of many types of feed bunk conveyors to suit your own preference. A feed-saving tombstone feed fence around the feed bunk is well worth the extra cost.

Many dairymen want to feed baled hay as well. In each wing, the plan provides for baled-hay feeding stations with tombstone feed fencing instead of four free stalls; 8-ft sliding doors open in the adjacent outside wall for putting in giant round bales or conventional square bales.

Manure

The slotted floor manure system eliminates the daily chores of manure cleaning and keeps both stalls and cows remarkably clean. Slotted floors can be made from reinforced concrete 'grid' sections made 4 x 8 ft x 6 in. deep. Concrete slats 8 in, wide provide a firm, textured walking surface for the cattle, and 1½-in. slots between the slats let manure and urine pass through.

Top-quality concrete slotted-floor grids with uniform slot widths and smooth, pencil-rounded top edges are most important, to prevent chipping and minimize risk of catching a hoof. Single-slat floor units may be used, but these are more likely to wobble if improperly fitted and they require more reinforcing steel than the slat grids.

To provide enough manure storage for long Canadian winters at minimum cost, long concrete trenches under the slotted floor passages conduct the semi-liquid manure by gravity to a deeper cross trench under the holding area. This cross trench in turn carries it to either a plunger-type manure pump installed permanently, or a pumping pit designed for a portable tractor-powered agitator pump for transfer to long term storage.

The manure trenches function as 'continuous-flow' gutters as used in Europe. Each gutter bottom is made smooth and level, with a 6-in. high dam across the overflow drop. Start by filling the trench with water to the top level of the dam; this dilutes and lubricates the manure as it accumulates. The manure starts to flow slowly over the dam, and the top surface

develops a slope, with the manure accumulating deepest at the end remote from the overflow. The longer the gutter, the deeper it should be to accommodate the manure slope without overfilling the trench at the far end. For dairy cattle manure with very little bedding included, German literature gives the following:

Gutter length (ft)	50	64	80	100	116	132
Min. gutter depth (ft +in.)	2'-6"	2'-7"	2'-11"	3'-3"	3'-7"	3'-11"

Note that Plan 2102 shows the maximum gutter length of 132 ft with a channel depth of only 4 ft. Limited experience in Quebec and Manitoba indicates this will work if silage is the main feed; if considerable hay is fed, relocate the deep cross channel to split the barn in two and thereby shorten the long channels. Never allow waste hay to get into the gutters; this is why the feed-saving tombstone feed fence is recommended here. Watch the continuous flow gutters for undesirable *meandering flow* or *islands* of solids which indicate manure sticking to the trench walls, especially at the rear of the free stalls where excess bedding can get tramped through the slotted floor. Cut these islands free of the walls and keep them flowing.

The plunger-type manure pump is operated daily until the manure flow slows down so that the pump is no longer operating full. It is not necessary or desirable to get all the manure out each time.

With the tractor-powered agitator-type pump, stir and pump manure to tanker or remote storage about once a week. In this case, extra holding capacity is provided by a cross trench 7½ ft wide.

If the barn is located near a hillside, it may be possible to drain the manure continuously to long-term storage by gravity alone. The only problem is freezing; in winter it is necessary to drain the cross trench into the unfrozen bottom of the storage so that the entire system is sealed against cold.

Completely drain and flush the trenches each summer if cattle go to pasture; this prevents manure from drying out and caking in the trenches when cattle aren't kept inside the barn. Re-prime the trenches with water and treat with insecticide or oil to control flies.

Obtain approval for your plans from proper local authorities before you start construction.