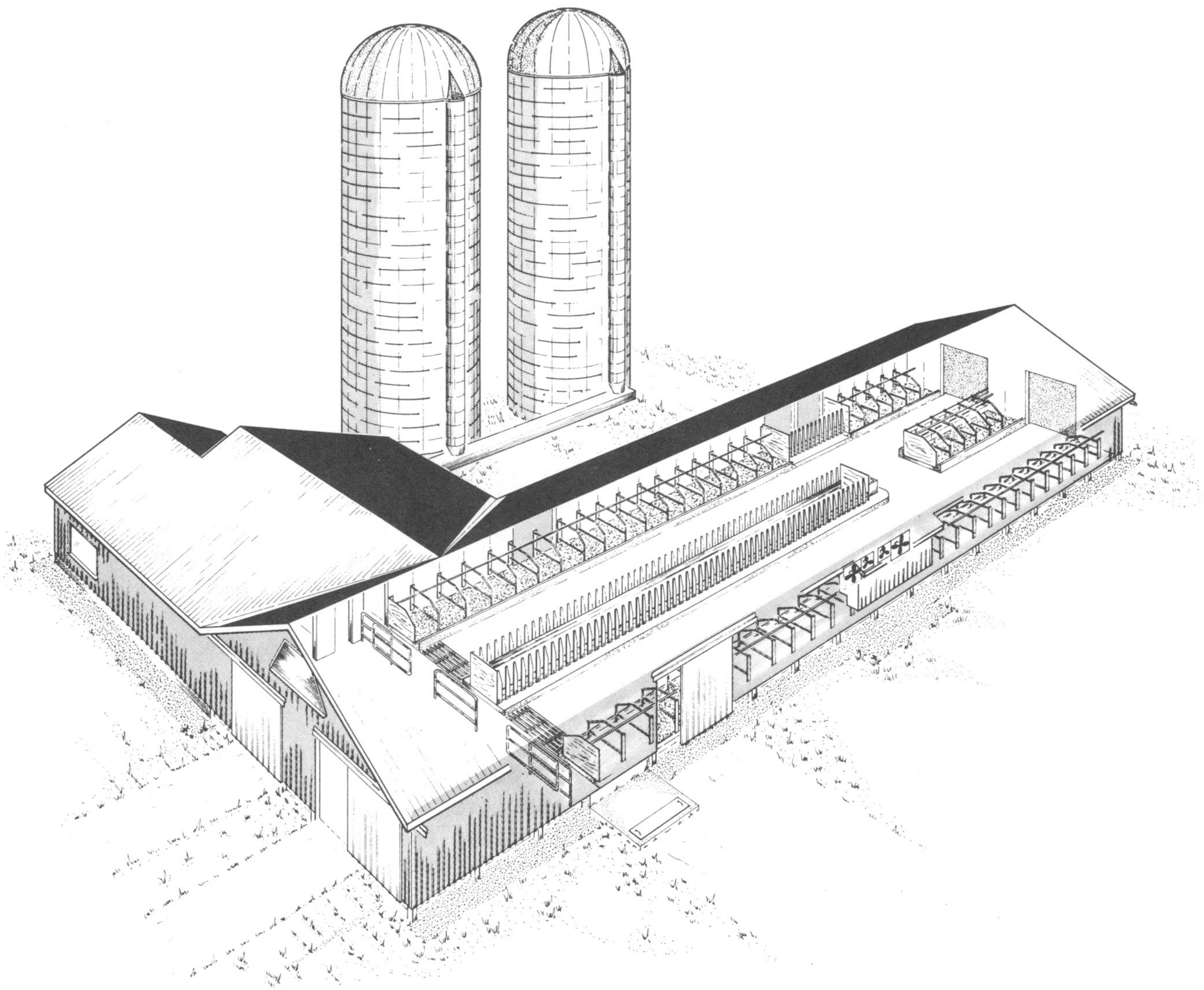
FREE STALL DAIRY SYSTEM - 60 COWS



DEVELOPED BY CANADA PLAN SERVICE

321-13

FREE STALL DAIRY SYSTEM – 60 COWS

CPS
PLAN M-2101 NEW 80-08

This is a detailed metric plan set showing a free-stall dairy barn 13.2 x 40.8 m to house a milking herd of about 60 cows; an optional wing can be added to either double the herd to 120 cows (13.2 x 34.8 m), or to house dry cows and bred heifers normally required to maintain a 60-cow milking herd (13.2 x 22.2 m).

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.

MILKING SYSTEM

The milking center is attached at the side of the main barn to allow for expansion. A double four herringbone milking parlor is shown (Plan 324-61 CPS M2501); 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 in the barn. This holding area provides 1.3 m^2 per cow, for 60 cows. 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 VENTILATION

Natural ventilation in a cold-modified environment might be suitable for areas with mild winter climates such as the lower Fraser Valley of British Columbia or southwestern Ontario, but for most of Canada the fully insulated construction with fan ventilation is recommended.

For fully insulated construction, walls are framed on pressure-treated square poles spaced at 2.4 m centers; horizontal 38 x 140 mm girts are fitted between the poles to support steel outside and plywood inside the claddings, with friction-fit insulation between. This construction has important advantages over conventional concrete foundation and stud-frame walls (i.e. better windstorm resistance and faster construction, which is especially important when building in bad weather).

For cold-modified environment construction, walls are framed on pressure-treated square poles spaced at 2.4 m centers, and horizontal 38 x 89 mm girts are nailed to the outside face of the poles to support interior and exterior cladding with no insulation.

The roof is framed with clear-span trusses usually spaced at 1.2 m. Select an appropriate Canada Plan Service truss, or see your truss supplier for a suitable prefabricated truss designed for the snow loads expected in your area. Roof with galvanized steel on 38 x 89 mm strapping.

For fully insulated constructed, nail the ceiling to a grid of 38 x 64 mm strapping spaced at 1.2 m both ways, and insulated from above, but for cold-modified environment construction, omit the ceiling and provide some insulation underneath the roofing (at least RSI-1.0) to prevent condensation and dripping. One good way to provide this insulation is given in Plan 306-50 (CPS M9302).

For ventilation in a fully insulated building, an adjustable swing baffle controls airflow from a long baffled 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 air inlet slots 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 down to a 3 mm slot to maintain at least 4 m/s 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. With milder weather, the step 3 fan will also operate occasionally, and the inlet must be opened to 9 mm, and so on.

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.

For ventilation in a cold-modified environment barn, adjustable flap openings under both eaves and a continuous slot at the roof ridge provide a natural movement of air. Without fans and thermostats, there is no precise control of temperature. The eave flaps can be controlled with a cable and winch to keep out snow, and maintain an inside winter temperature about 5 to 10°C. above outside. For ventilation in milder weather (above freezing), tilt-in window panels can be opened; for hot summer weather, large sliding doors open for the best possible cow environment. Since this barn will freeze in typical Canadian winters, electrically-heated waterers are essential.

FEEDING SYSTEM

A convenient feed room can be built on the side of the milking center, or on the side opposite. From there, overhead conveyors carry silage, concentrates and possibly chopped hay to a mechanical bunk conveyor. 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; sliding doors in the adjacent outside wall can be opened for putting in giant round bales or conventional square bales.

MANURE SYSTEM

This plan is designed for tractor scraping of the alleys to a manure cross trench at the end of the alleys adjacent to the holding area. The trench is covered with a grid of pipes spaced far enough apart to allow manure to pass through, and a removable cover plate which allows cattle to walk over the grid.

The cross trench moves the semi-liquid manure by gravity to either a plunger-type manure pump installed permanently, or to a pumping pit designed for a portable tractor-powered agitator pump. Either pump can transfer the manure through a buried pipeline to long-term storage.

The manure trench functions as a ‘continuous flow’ gutter as used in Europe. The trench bottom is made smooth and level, with a 150 mm 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 make room for the manure slope without overfilling the trench at the far end. Liquid waste from the milking center may be pumped into the 'top' end of this trench.

Never allow waste hay to get into the manure system; this is why the feed-saving tombstone feed fence is recommended here.

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 as required, possibly every 5 to 7 days. 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.

If cattle are pastured during the summer, water may need to be added to flush the trenches. Obtain approval for your plans from proper local authorities before you start construction.