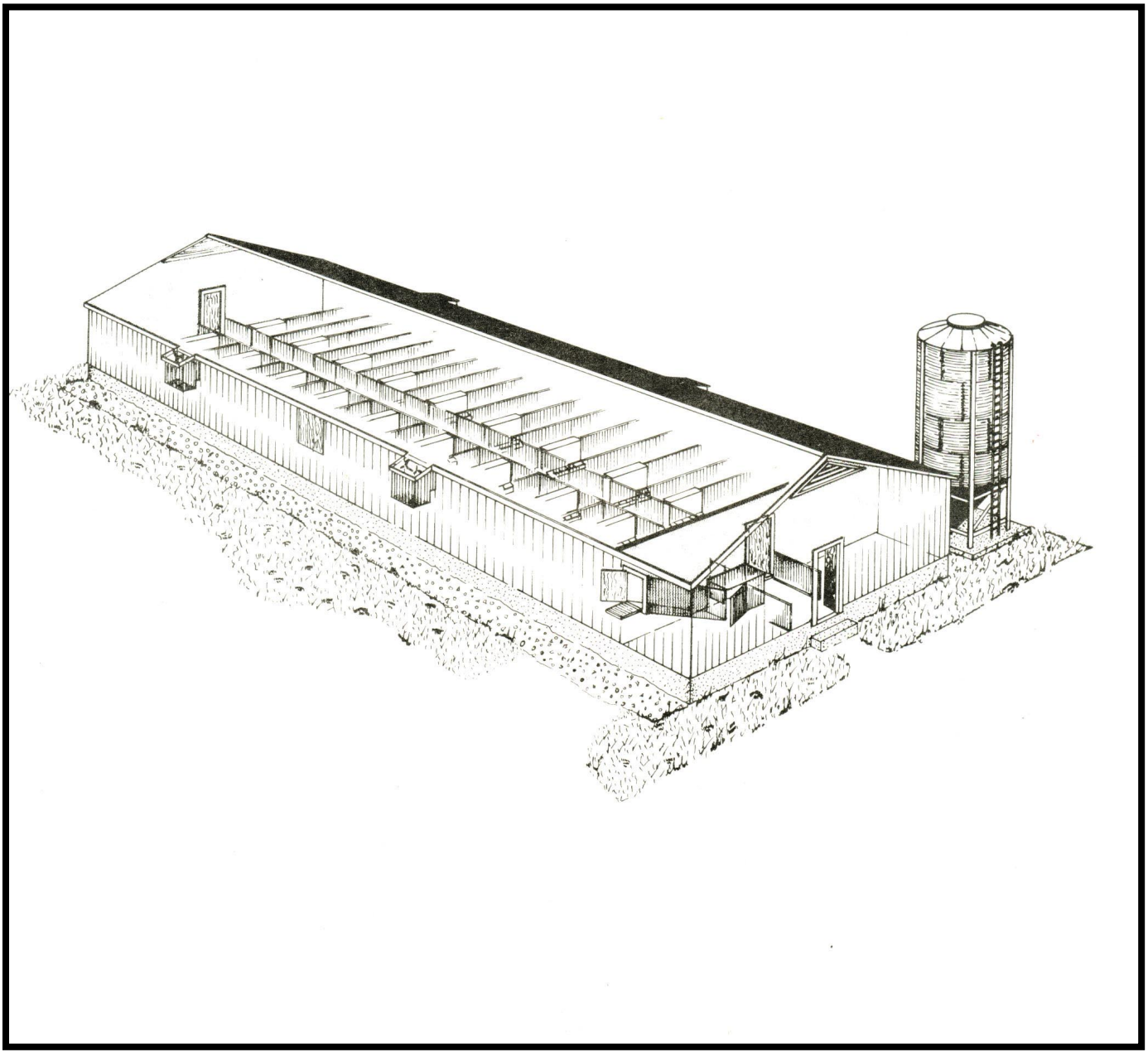
BRITISH COLUMBIA Ministry of Agriculture, Food and Fisheries
Agricultural Building Systems Handbook
PLAN
362-51

GROWER – FINISHER BARN



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GROWER-FINISHER BARN

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This plan gives details for building a 36 ft. clear-span grower-finisher barn for swine. It will house about 500 pigs from 50 to 200 lbs. live weight; typical continuous production capacity based on 14 weeks growing-finishing period will be about 1800 market pigs per year. Building length can be increased or decreased to adjust the capacity of the unit.

WEIGHING AREA This plan includes a weighing area with an arrangement of pens and gates for easy sorting of pigs. A ramp and small door are provided for trucking pigs in and out.

PENS For floor feeding, relatively small 5 x 16 ft pens are suitable for up to 20 growers at 4 sq ft/pig, or 10 finishers at 8 sq ft/pig. This allows the manager to move groups of 20 weanlings into the grower pens without introducing any 'strangers' into the group, a practice that helps prevent fighting and stress. As soon as more pens are available, the groups of 20 pigs are split into uniform finishing groups of 10, at 8 sq ft/pig. Since growing and finishing pens are identical, this makes a flexible arrangement that keeps the barn full yet allows some variation in pig production. Reduce pen groups to 8 finishers @ 10 sq ft/pig in hot weather and when finishing to the full 220 lbs. live weight now allowed by the grading rules.

For feeding with self-feeders, the 5 x 16 ft pens will be too small, an alternate floor plan shows larger 6 x 16 ft pens, suitable for up to 24 growers or 12 finishers. Pens up to 8 ft wide can be used, but pens wider than 8 ft can cause bad dunging habits and more problems with dirty pens.

MANURE SYSTEMS Four different manure systems are shown; sheets 2, 3, 4 and 5 each give one option. Whichever system is used, check with local pollution-control authorities to be sure your plans are approved before starting to build.

GUTTER CLEANER (sheet 2) If you plan to use a bedded system (straw, sawdust, etc.) this is the best method of manure removal. A gutter cleaner in a shallow gutter follows the outside walls, and a steel grill over the gutter keeps out pigs. It is relatively easy to scrape manure and soiled bedding under the grill. Provide a storage pad outside to stack the bedded manure, and collect the polluted stack runoff in a tank or holding pond for land-spreading. The 'step 1 continuous' exhaust fan should be relocated to blow warm air out through the gutter cleaner opening; otherwise the gutter opening becomes the cold fresh-air inlet during winter, causing cold drafts in nearby pens and freezing the gutter-cleaner chain.

SLOTTED FLOOR CONTINUOUS FLOW (sheet 3) This is a liquid manure storage system designed to operate without bedding and with minimum labor. Slotted concrete floors cover the outer 6 ft part of the 16 ft pens, or 37% of the pen area; the actual proportion of slotted floor is not fixed, but pigs do better on floors partly slotted than on floors 100% slotted.

Concrete slats are 8 in. wide with smooth flat tops, pencil-round edges, and with 1 in. slots parallel to the 16 ft pen length. Foot injuries seem to be minimized with this arrangement. Other arrangements sometimes clean better; see Agriculture Canada Publication 1451, Confinement Swine Housing.

Shallow gutters under the slotted floors are drained slowly and continuously to a deeper cross-gutter at the center of the building length. The system is a proven European development. The gutter bottoms are made smooth and dead level, and a small dam at the outflow from each gutter traps a 6 in. depth of liquid in the gutter to prevent drying and sticking. To start, the gutters are primed with 6 in. of washwater. After the first pigs go in, manure soon starts to trickle over the dams, and the manure surface builds up to a slight slope (enough to keep the entire gutter contents moving slowly towards the outlet gutter). This deeper gutter is drained each day or two by opening a valve leading through a gas trap to separate storage outdoors.

UNDER-SLAT FLUSHING SYSTEM (sheet 4) Here the slotted floor is made exactly as in the 'continuous flow' system, but the manure is frequently flushed out of shallow gutters to eliminate the manure gases encountered where manure is stored for extended time under the floors. The gutter bottoms slope towards the outlet pipe, and a flush-tank at the upper end of each gutter accumulates flushwater. Whenever a tank is pumped up to the 'overflow' level, an automatic dump-siphon suddenly drains the flush tank into the gutter, flushing it clean.

Flushwater supply must be recycled manure liquids, otherwise the volume of waste to be stored for a winter will be enormous. The flushwater is usually separated from the liquid manure and partly treated to reduce

odors and to improve its flow characteristics. It is then recycled back to the flush-tanks with a small liquid-manure pump.

STOP-AND-FLOW MANURE SYSTEM (sheet 5) Here the gutters under the slotted floors are deepened to give 2-3 weeks of storage. Whenever the gutter fills to about 6 in. below the slats, plug-valves are jerked open, and manure drains rapidly into a sewer pipe crossing the barn under the gutters. This is the simplest manure system, but it produces more odors and manure gases due to the increased storage time. Watch for manure solids that accumulate in the gutter bottom if flushing is incomplete.

VENTILATION AND HEATING Ventilation consists of a cluster of thermostats (located at the center passage) controlling eight exhaust fans grouped in four fanhoods on both sides of the building. It is important to provide automatic control of ventilation rate through 'stepped' thermostat settings and properly-matched fan capacities. A table on sheet 1 gives a schedule of fan sizes, thermostat settings and air inlet adjustments for optimum ventilation, from coldest winter to warmest summer weather. Adjust the thermostats in the series of temperature steps so that the best room temperature is maintained regardless of weather. Note that the Step 1 fan is sized below the average cold-weather rate and is intended to run continuously; its thermostat is set below room operating temperature, and it serves only as a safety cut-off in case of heating failure or other emergency.

The key to good ventilation is a precise, adjustable air inlet, like Plan 9711 (Center Air Inlet), or 9712 (Side Air Inlet). Opinions are divided on the relative merits of bringing in fresh air at the sides or center of the room. In either case the recommended inlet is a continuous baffled slot of uniform adjustable opening. In hot summer weather maximum fresh air is drawn through inlet slots adjusted to give about 400 fpm air velocity. If summer air is introduced through the attic, take steps to ensure minimum temperature rise in the attic (white painted roof, or a layer of 1/2 in. insulation board between roofing steel and purlins).

In winter, adjust the inlets to give at least 800 fpm inlet air velocity at the slots. The best way to do this is to install an inclined-tube manometer to indicate the pressure drop where air passes through the inlet slots (inlet duct to room). Then adjust the inlet flaps with winch and cable until the pressure drop is about 0.05 in. (water gauge) across the inlets; this pressure drop corresponds to the minimum 800 fpm air velocity. When the next thermostat calls for increased ventilation, the suction in the barn will increase, the fans will work harder, and the air velocity at the inlet will approximately double; this will do an even better job of mixing air along the ceiling. As shown in the Ventilation Schedule (sheet 1), the operator should anticipate which thermostat will be cycling at any given weather period, and set the inlet adjustment accordingly; four basic inlet settings will be required for the five-step ventilation shown in the Schedule. Note that in hot summer weather it is better to open the inlets more fully, to increase the air-moving capacity of the big, belt-driven summer fans.

For good operating economy, it is important to specify the new high-efficiency motors, particularly for the smaller fans that operate all year.

Supplementary heating will be required for good ventilation whenever outside temperature goes below about -10^{o}C. Heat may be added by hot-water piping in the floor near the front of the pens, by hot water radiators along the walls under the inlets, or by various air-heating systems. Air-to-air heat exchangers and wall-mounted solar systems offer further choices for warming the intake air supply.