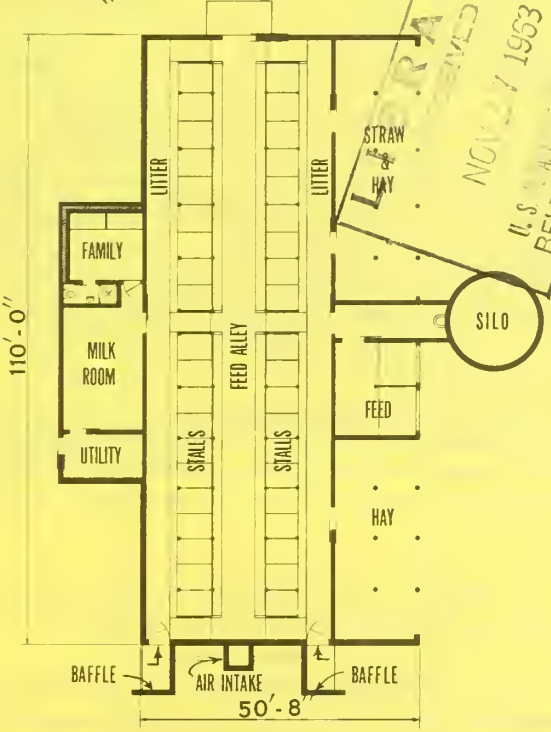
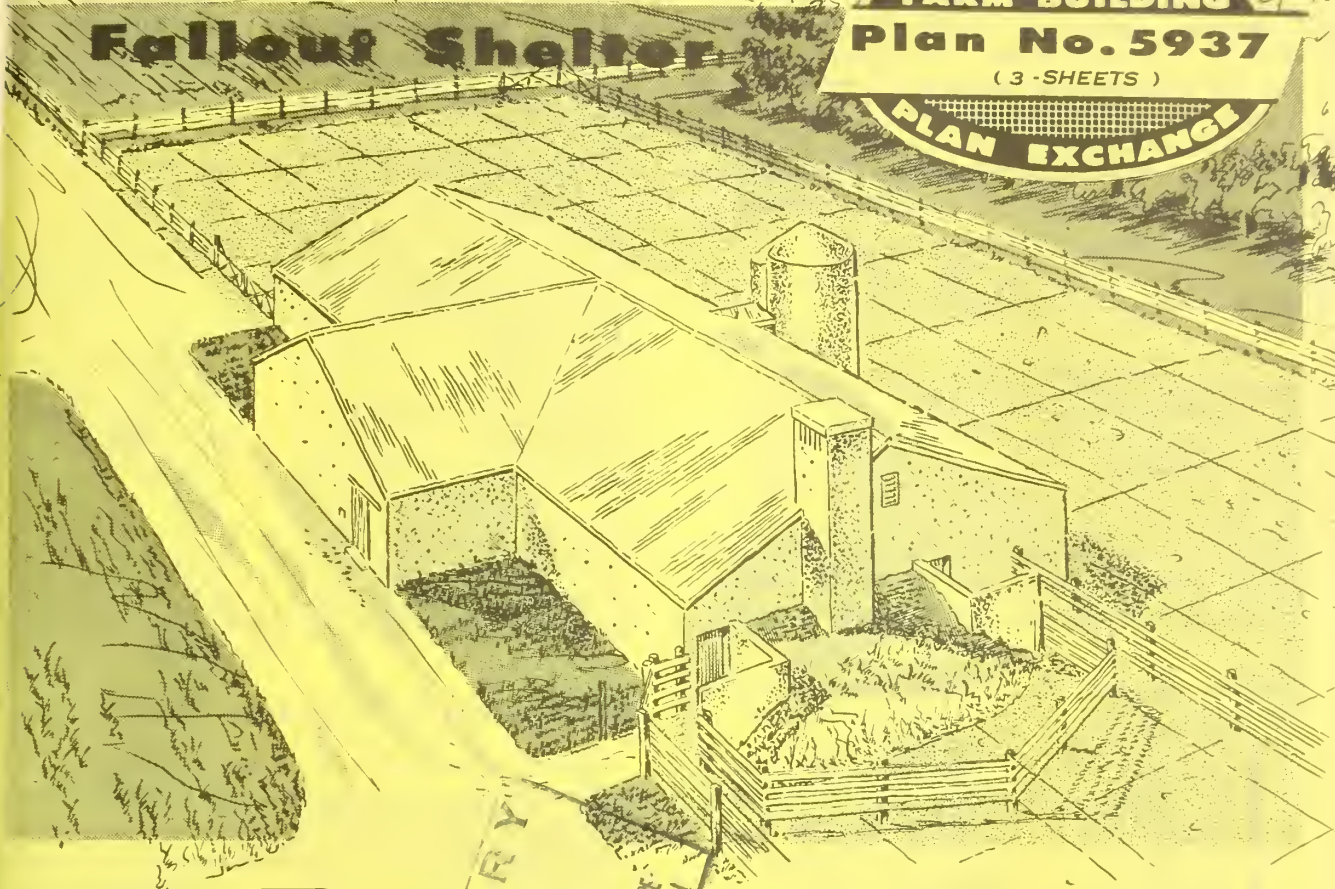


# Dairy Barn

## Fallout Shelter

**COOPERATIVE FARM BUILDING**  
**Plan No. 5937**  
 ( 3 - SHEETS )  
**PLAN EXCHANGE**



40 STALL FACE - IN PLAN

This 40-stall dairy barn is designed not only for the daily production of milk but also for emergency protection from fallout for the family and herd. The following points make it a good design for fallout protection:

1. It is used daily, so use in an emergency is familiar.
2. It combines the family shelter for 6 people and the dairy barn under the same roof. The dairyman can care for his stock, and his family can live on milk if necessary.
3. It has power equipment, so it can operate as an entity.
4. It has good overall fallout protection—a factor of 70 to 110 in the dairy barn and over 250 in the family shelter. The shielding provided in the family area reduces the radiation to less than half that for the rest of the structure.
5. Its construction is permanent with minimum depreciation in structural strength and protective efficiency. Sand 2 feet deep is used for overhead shielding.

Washington, D.C.

Issued October 1963

**UNITED STATES DEPARTMENT OF AGRICULTURE**

**Miscellaneous Publication No. 943**

## BASIC COST FACTS

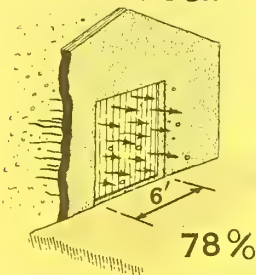
This barn costs more than most stanchion barns and operation efficiency may be less than in highly mechanized barns. Power costs are high because there are no windows. In this design the cost of fallout protection is part of and increases the expense of normal operation. A barn with normal operation facilities plus an emergency fallout shelter may cost as much as this combination system. The emergency facilities are better in this design than are possible in underground dugouts or similar emergency makeshifts.

### Radiation sources in this plan:

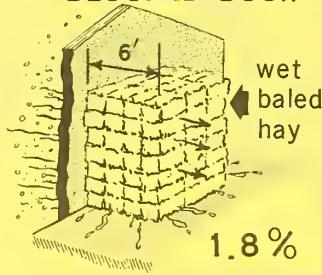
	Percent
From overhead . . . . .	6
Through hay storage . . . . .	37
Through walls . . . . .	31
Through doors . . . . .	26
	<hr/> 100

The three outside doors admit 26 percent of the gamma radiation. Emergency shielding can greatly reduce the gamma radiation passing through the door.

**NORMAL DOOR**



**BLOCKED DOOR**



*Emergency shielding reduces gamma rays passing through door*

The main door of this design is 6 feet wide and admits 26 percent of the radiation passing to the center of the dairy barn. Baled hay stacked in a pile 6 feet wide against the door and soaked with water to increase its weight reduces the radiation passing through the blocked door to only 1/46 of the radiation passing through the normal door. The blocked door admits only 1 percent of the radiation passing to the center of the dairy barn. Stacked bales increase the protection factor from about 70 to 90.

*Placing mass between you and radioactive fallout is effective.*

### HOW TO ORDER WORKING DRAWINGS

Complete working drawings may be obtained through your county agent or from the Extension agricultural engineer at most State agricultural colleges. There is usually a small charge.

#### ORDER PLAN NO. 5937 DAIRY BARN FALLOUT SHELTER

If working drawings of this plan are not available in your State, write to the U.S. Department of Agriculture, Agricultural Engineering Research Division, Plant Industry Station, Beltsville, Maryland. The U.S. Department of Agriculture does not distribute drawings, but will direct you to a State that does distribute them.

## WHAT MAKES A GOOD SHIELD?

Mass overhead

. . . and the strategic use of mass in other less protected areas.



Handy usable materials are baled hay, straw, concentrates, and bulk manure.



Earth banks about the building.

Minimum of outer openings.



Baffles to limit the field of radiation into the openings.



## ENVIRONMENTAL CONSIDERATIONS

Air and water supplies are absolute necessities; food and standby power supplies are highly desirable. Multi-speed ventilation fans should deliver 4,000 to 16,000 cubic feet of air per minute, the lower rate during cold weather. A 9-inch diameter air pipe should run from the intake distribution plenum chamber to 6-inch diameter branch pipes into the family shelter and the milkroom.

Since the barn has no windows, 1 watt of incandescent lighting per square foot is needed. The size of the generator required depends somewhat on the other demands. Consider the water pump, milk cooler, vacuum pump, gutter cleaner, silo unloader, water heater, and possibly an electrical hot plate. A generator of approximately 15 KW capacity, 240/120 volt, 60 cycle arranged with a cut-in switch to the service entrance of the building is suggested.

Gasoline is stored in an underground tank outside the utility room, and the gasoline fumes from the standby generator motor and air from the compressor are vented to the outside.

The dairyman can service the water pump, vacuum pump, and generator with minimum exposure.

Manure accumulates at the rate of 3/4 to 1 1/4 cubic feet per day per cow. If it cannot be removed mechanically, pile it near the main door, which is directly under the exhaust fan.