

# SELECTING A FARM BUILDING

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## CONSIDER THESE FACTORS WHEN SELECTING A FARM BUILDING

**COST** - Use a building plan to get comparative, realistic estimates of buildings of equal quality and that estimate for the same things. (You usually get what you pay for.)

**WIDTH AND LENGTH** - A round building encloses the most space for the least building surface. A square building is nearly as efficient but width (over about 80 ft.) can be a limiting factor. Lengths over 3 to 4 times the width are questionable.

**HEIGHTH** - Most heated buildings have about 10 ft. high walls. Although headroom is nice it increases heating costs and heights over 16 ft. are seldom needed.

**DURABILITY** - A letter of certification (warranty?) stating design loads and safety factors is available from manufacturers. Quality of permanent colors, reinforced protection for doorways, corners, etc. are important.

**INSULATION** - A stud frame, trussed-rafter is the most practical building to heavily insulate. Pole frame, rigid frame, arch roof and concrete buildings are more difficult.

**DOORS** - Extra framing is needed for wide doors in sidewalls. Having all traffic through endwall doors is a problem in long (over 80 ft.) buildings.

**WINDOWS** - Locate in upper part of sidewalls (not roof) for fewer leak problems, more useful lighting and cross ventilation.

**AVAILABILITY AND SERVICE** - A good reputation for completion with good follow through and reliable service is worth a lot.

**FLOOR AND FOUNDATION** - Are a part of durability and cost. Rodents, traffic, building alignment, drainage are affected.

**CONSTRUCTION MATERIAL** - Good lumber is getting harder to find. Metal is a uniform material. Concrete is durable. Wood is more economical for small, irregular buildings, steel for large prefabricated construction. Some earth being used.

**APPEARANCE** - A pleasing shape and color blends well with other buildings. Doors and windows can affect looks.

**EXPANSION** - Consider how and where future additions can be made to the building.

**MULTIPLE USE** - Sometimes a building is built for so many uses it is hardly good for any. Flexibility is important but avoid sacrificing too much from the intended first use.

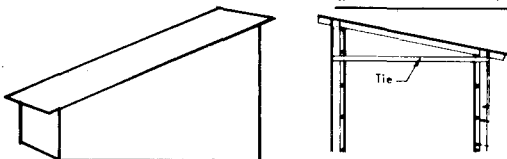
**BESIDES WEATHER** (Hail, wind and snow loads), a building resists rodents, birds, machinery bumping, fire, grain loads, pressure washing and moisture inside from poor venting.

SOME GENERAL RECOMMENDATIONS

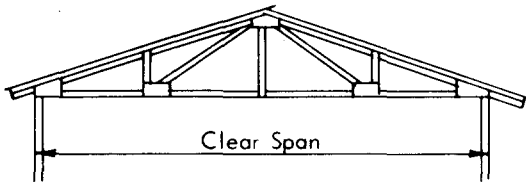
BUILDING NAME	APPROXIMATE COST	TYPICAL OR RECOMMENDED TYPE OF CONSTRUCTION	USUAL SIZE OR SPACE REQUIREMENTS	FLOOR CONSTRUCTION	WALL AND ROOF CONSTRUCTION
Home	\$30-50/Sq.Ft.	Insulated wood frame, 1 or 2-story, gable truss rafter or hip roof.	24'-32' Wide, 40'-80' long, attached garage.	Basement of poured concrete, concrete block, or treated wood.	2x4" or 6" stud sheathing, lath masonry, asp
Machine Storage	\$4-8/Sq.Ft.	Uninsulated metal-clad, wide endwall doors (min.) & sidewall doors for over 80' long.	40'-60' wide, 80'-150' long w/12' to 16' eave ht. Use individual machine measurements.	Packed clay w/gravel or 4"-5" concrete slab.	Corrugated metal roof, poles & truss rafter or steel frame.
Farm Shop	\$8-15/Sq.Ft.	Insulated wood frame, windows in upper part of sidewalls, large 24' wide plus smaller doors.	32'-60' wide, 40'-100' long, 12'-16' eave ht.	5" reinforced concrete w/slope to drain + outside ramp.	2x6 studwall, concrete block interior walls or steel truss rafter or
Grain Storage	\$.50-\$1/Bu.	Round steel & OH bins w/conveyor system & large flat storages. Tall elevators for grain handling.	18'-30' diameter or more & 20'-40' high. 40'x100'x12' and up. 1 Cu.Ft. = .8 Bu.	4"-5" reinforced concrete w/aeration + unloading and filling system.	Round corrugated steel. Steel rigid frame or slant tilt up concrete
Hay & Straw Storage	\$3-6/Sq.Ft.	Metal-clad, part-open 16'-20' high sidewalls tractor loader or feed through fence. Some overhead storage in barn.	Loose: 4&2 lbs./Cu. Ft. Chopped: 6&7 lbs./Cu. Ft. Baled: 6&4 lbs./Cu.Ft.	Gravel over packed clay, 4" concrete feeding ramp.	Pole frame, interior posts & beams, roof or truss rafter.
Silos	\$10-40 or \$25-20/Ton	Hillside trench or concrete bunker. Upright concrete or O <sub>2</sub> free.	20'-40' wide x 8'-16' high. Wt. approx. 40 lbs./Cu.Ft. 18'-24' diameter to 90' high.	South-sloped, well drained packed soil or 5" concrete	Tilt up reinforced concrete. Precast concrete or steel.
Vegetable Storage	\$10-20/Sq. Ft.	Below ground. Large, insulated above ground. Environment controlled.	Family size 8'x10'x 8'. Potatoes weigh 42 lb./Cu.Ft. 20'x100'x 18' bins.	Packed soil, 5" Concrete, vent-air ducts	Concrete walls. & beam interior 12" studwall or steel frame.
Beef Barn	\$3-8/Sq.Ft.	Uninsulated barn for shelter & inside cattle handling. Insulated treatment barn.	Calves-18 Sq.Ft./Head Yr'ling-22 Sq.Ft./Head Cows-28 Sq.Ft./Head	Packed clay, perforated metal, 5" concrete	Pole type w/shear truss rafter. Plank and concrete
Beef Feedyard	\$100-\$200/ Head	Uninsulated barn to cover year-round feeding facility.	200 Sq.Ft./Hd, well-drained 400 Sq.Ft./Hd, poor 1.5-2 Ft./Hd Bunk sp.	4%-6% S. Sloping to drain. Mounds. 5" concrete paving. Rough surface.	Windbreaks required. Pole type shed truss rafter.
Dairy Barn	\$1,000-\$2,500/Head	2-story stanchion barns to 50 head. or loose hsg. on manure pack. Freestall for over 50 hd.	4'x6' stall + manger, 60 to 100 Sq.Ft./Cow, 4'x7'-3" freestall	4"-5" concrete alleys feed mangers, etc. Packed clay freestalls.	Insulated studwall with gambrel or roof. Post-beam truss roof.
Calf Barn Milkhouse Parlor	\$10-25/Sq.Ft.	Insulated wood frame, windows in upper part of walls. Wide MH door and concrete ramp + light.	16'-20' wide usually x 20'-30' long w/8' high insulated ceiling	4"-5" reinforced & sloped concrete to floor drain. Found. 6" above floor.	2x6" insulated wall, truss rafter concrete block interior partition
Hog, Farrow-Nursery	\$20-30/Sq.Ft.	Insulated wood frame, concrete foundation and concrete block interior walls. Pressure wash.	24' wide x 60' long x 8' ceiling. 5'x7' crates + alleys. 4.5' x 12' pen per sow.	Heated, sloped concrete to floor drain. Part slat floors.	2"x6" studwalls truss rafter (1" or post beam gable roof).
Hog Growing	\$10-20/Sq.Ft.	Insulated, wood frame, concrete foundation and alley floors sloped to drain. Uninsulated gestation facility.	30-60 lb.:3-4 Sq.Ft./ Pig 60-150 lb.:4-6 Sq.Ft./ Pig 150-210 lb.:8 Sq.Ft./	4" reinforced sloped concrete. Part-slat floor with concrete slats.	2"x6" studwalls truss rafters. Insulated ceiling. Some bedding.
Sheep Lambing	\$8-15/Sq.Ft.	Insulated, wood or steel frame w/fan ventilation for early lambing. Straw bedding, shorn ewes.	15-20 Sq.Ft. per ewe and lamb in barn. 4'-5' pens + alleys and storage.	Packed clay or 4" sloped concrete. Some slat flooring.	Studwall, shed gable post & beam or truss rafter Old 2-story barn
Sheep Feeding	\$5-10/Sq.Ft.	Uninsulated barn and outside feeding. Insulated confinement for year-round operation	6-8 Sq.Ft./lamb in barn. 20 Sq.Ft. yard space. 9"-12"/lamb feeder space.	Packed clay or 4" sloped concrete. Slat floors used some	Pole type, stud frame w/truss rafter or steel frame for large
Horses	\$5-10/Sq.Ft.	Uninsulated barn w/hay-loft, boxstalls, tie-stalls. Heated space for office, show preparation.	30' wide x 60' long. 12'x12' boxstalls + alley, tack, feed, tractor, etc.	Packed clay stalls 4" concrete drive alleys. Consider rodents.	Pole type, stud wall/truss or post beam roof. L. steel frame.
Poultry	\$8-12/Sq.Ft.	Floor system for brooding, grow & 1,000 bird laying. Cage systems for several thousand layers.	.5 Sq.Ft./Bird to 6 weeks. 1-2.5 Sq.Ft./layer + alleys & storage.	4"-5" concrete sloped for cleaning, Scraped or liquid manure.	Insulated studwall or pole type w/truss rafter or 2-story posts.

INSULATION "R" VALUES Found. Walls Ceiling			VENTILATION TYPE APPROXIMATE RATES	HEATING SYSTEM, CAPACITY, FUELS	OTHER INFORMATION SOURCES, ETC.
12	20	40	Bath & kitchen ex. fans, vented ridge & soffit at 1 Sq.Ft./300 Sq.Ft.	Approximately 50-100,000 BTU/HR capacity or 20-25 watts/Sq.Ft.	See MWPS-16, Family Housing Handbook, Use energy efficient construction ideas and consider alternate fuels use.
--	--	--	1 Sq.Ft. roof ridge vent per 800-1,200 Sq.Ft. floor area.	Consider use as solar collector.	Several different MWPS plans. Extra construction needed for use as emergency grain storage.
10	16	32	Vehicle exhaust pipe and welding exhaust fan.	Approximately 10 watts/Sq.Ft. Heat stored in floor from off-peak or solar.	See AE-85 "Farm Shops". Consider water and sewer system.
--	--	--	0.05 to 0.1 cfm/Bu for aeration, 1 to 5 cfm/Bu for drying. Roof vents.	LP, electric or burn biomass for drying.	See MWPS-13 "Grain Feed Handling Handbook" and MWPS Plans.
--	--	--	1 Sq.Ft. roof ridge vent per 800 Sq.Ft. floor space. Inside feeding takes more venting.	Solar-assisted natural air drying.	MWPS-1 "Structures & Environment Handbook". Several MWPS Plans.
--	--	--	Roof Openings	--	MWPS-1 "Structures & Environment Handbook". AED-15 Tilt-Up Concrete Silos.
10	30	40	Gravity-vent small units Provide 1-1.5 cfm/CWT for cont. environment.	5 BTU or 1.5 Watts per hour/100 lbs. potatoes.	See Electric Farm Power Quarterly No. 68, or AE-90 "Potato Storage Ventilation".
Straw	16 (calving barn)	24	Open-ridge outlet, adjustable overhang and wall air inlets.	Radiant heat in calf creep area. Hot air in treatment facility.	See MWPS-6 "Beef Housing & Equipment Handbook" for general barn and handling system planning.
Straw	--	--	Provide summer shade. 25-100 cfm/head for confinement barns.	Electric or LP gas heated waterers and concrete slabs.	Different MWPS plans for confinement feeding barns. Great Plains Beef Cattle Handbook for management information.
10	20	40 (warm housing)	Exhaust fan capacity 25-100 cfm/1,000 lb.wt.	Electric or LP gas heated waterers and steps.	See MWPS-7 "Dairy Housing & Equipment Handbook". Size of herd, manure handling affects building selection.
--	--	4	w/open ridge and adjustable sidewalls for cold barns.		
10	20	40	3-5 air changes/hour. Exhaust fans w/ceiling air inlets.	Hot air 10,000 BTU/Hour in MH, 50-70,000 BTU/Hour in parlor, calf housing.	Different MWPS plans for various sizes and types of facilities.
10	20	40	20 cfm/sow (minimum) 80 cfm/sow (normal) + summer cooling	2,000 BTU/hour per sow hot air plus creep floor heat.	See MWPS-8 "Swine Housing & Equipment Handbook". Building selection depends on size, manure handling and management.
10	20	40	25 cfm/1,000 lbs.(min.) to 150 cfm/1,000 lb. exhaust fan cap. More in summer.	Floor heat for small pigs.	Insulated but naturally vented barns are used.
10	20	40	25 cfm/1,000 lbs.(min.) to 150 cfm/1,000 lb. exhaust fan capacity. more in summer.	Heat lamps for lamb creep. 2,000 BTU/ewe hot air heat.	See MWPS-3 "Sheep Housing and Equipment Handbook".
10 (Warm Housing) (Cold Housing)	20	40	25 cfm/1,000 lbs.(min.) to 150 cfm/1,000 lbs. exhaust fan capacity. More in summer.	Electric or LP gas heated waterers. Solar-assist venting.	Different MWPS confinement sheep barn plans or pole type barn plans.
Straw	13	16			
Straw	2	4 or Hayloft	Vented ridge w/adj. wall openings (cold) 150 cfm/1,000 lb.(warm)	Heated waterers, Solar hot air for venting.	See MWPS-15 "Horse Housing & Equipment Handbook". Different pole barn plans. Need for equipment storage.
10	20	40	0.1 cfm/chick 3 to 5 cfm/layer	Brooder radiant or hot air heat	See MWPS-1 "Structures & Environment Handbook".

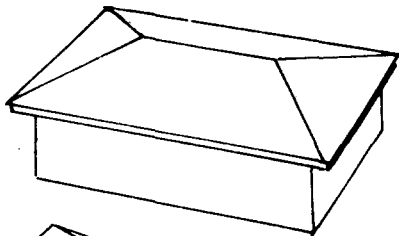
**SOME ROOF AND WALL TYPES USED FOR FARM BUILDINGS**



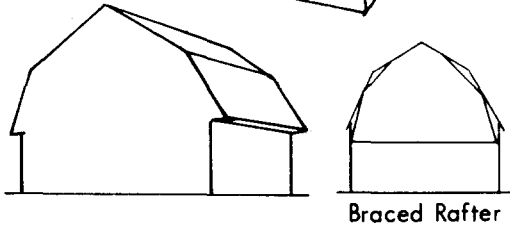
**SHED** - Roof slopes one direction. Simple to build. Can go up to 20 ft. wide. Wider clearspans are uneconomical and post support used.



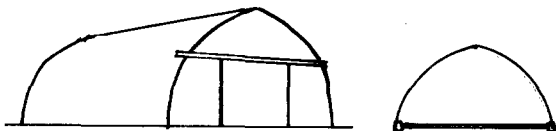
**GABLE ROOF** - The same length and roof slope in opposite directions. Simple to build. Width depends on roof slope, rafter bracing. Trussed rafters or posts and beams usually used on buildings 24 ft. wide to 60 ft. wide. A 4:12 roof slope or more is recommended.



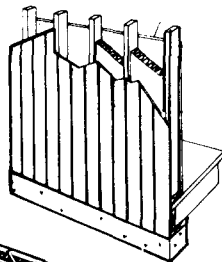
**HIP ROOF** - Roof slopes four ways. Permits water to go on all sides of building. Distributes roof load to all four walls. Harder to build than gable. Ridge supports have to be heavier than regular rafters. With rafter support width can be 30 ft. or wider.



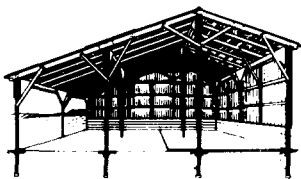
**GAMBREL** - Actually a type of braced rafter. Very commonly used in large barns to gain clearspans 32 up to 40 ft. wide. Rafters usually are 2 ft. apart but heavy rafters, cross-framed for smaller intermediate rafters sometimes used. Often called "hip roof".



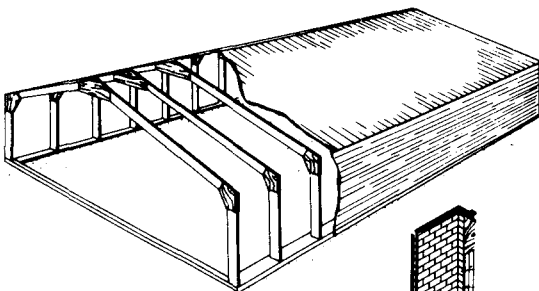
**GOTHIC** - Arch or round rafter building. Rafters usually 2 feet apart but heavier ones are put 4 and 8 ft. apart and nailing girts used to support roofing. Commercial glued rafters are boards laminated one on top of the other. Other types are laminated side by side. Provide high, clearspan areas over 40 ft. wide. "Quonset" roof (a commercial type) is large, heavy corrugated metal.



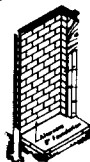
**FRAME OR STUD WALL** - 2x4, 2x6 or larger, 12, 16 or 24 in. apart. Solid 4x8 sheets, diagonal sheathing or bracing for bracing. Used in buildings that require a foundation or that will be insulated. (Homes, farrowing houses, barns, etc)



**POLE OR POST WALL** - Five inch top diameter or 6x6 posts 7 ft. or more apart. Usually 2x6 nailing girts 2 ft. apart for nailing on sheet metal or 1/2 inch plywood sheathing. Used in livestock buildings, machine sheds and buildings with no floor or insulated walls.



**RIGID FRAME** - 2x8 up to 2x12 plank nailed and glued together, placed 2 up to 4 ft. apart. Foundation or slab essential. Used mainly for machine sheds and grain storages where clear, open area is desired.



**MASONRY OR TILT UP CONCRETE** - Usually 6, 8 or 12 inches thick. Foundation required. Used for farm shops and where rotting and fire problems exist. Difficult to get a warm wall.