University of Missouri Extension

G1801, Reviewed October 1993

How to Size a Farm and Home Water System

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A farmstead water system should be able to supply the peak flow rate continuously for two hours. A home water system should be able to supply peak demand continuously for one hour. If the peak use rate exceeds the maximum well yield, provide intermediate storage.

If you want water for fire control, the system should be able to supply 20 gallons per minute at 60 pounds per square inch pressure.

For more details on computing system capacity, see Private Water Systems by Midwest Plan Service, available from:

- Agricultural Plan Service
  200 Agricultural Engineering Building, MU
  Columbia, Mo. 65211.

Home flow rates

Table 1 gives water use rates of several commonly used items. For an easy way to determine flow rates for a home, refer to Table 2. Add the home flow rate to the farmstead rate to determine total system capacity.

Table 1
Home and outdoor living water requirements

Use	Flow rate	Total gallons used
Adult or child		50 to 100 per day
Baby		100 per day
Automatic washer	5 gallons per minute	30 to 50 per load
Non-automatic washer	5 gallons per minute	15 to 45 per load
Dishwasher	2 gallons per minute	7 to 15 per load

Garbage disposer	3 gallons per minute	4 to 6 per day
Kitchen sink[1]	3 gallons per minute	2 to 4 per use
Shower or tub[1]	5 gallons per minute	25 to 60 per use
Toilet flush[2]	3 gallons per minute	4 to 7 per use
Bathroom lavatory	2 gallons per minute	1 to 2 per use
Water softener regeneration[3]	5 gallons per minute	50 to 100 per time
Backwash filters[3]	10 gallons per minute	100 to 200 per backwashing
Outside hose faucet	5 gallons per minute	
Fire protection[4]	10 gallons per minute	1,200 per 2 hour period

[1]Water flow restricting valves and shower heads can reduce flow and water use by up to 50 percent.
[2]Ordinary toilet; low flow toilets will reduce water usage by 40 to 90 percent.
[3]Water hardness, softener size, etc. affect water use.
[4]For limited fire fighting; at least 10 gallons per minute with a 1/4-inch nozzle at 30 psi for 2 hours per day (1,200 gallons). Preferred: 20 galllons per minute at 60 psi for 2 hours per day (2,400 gallons).

Table 2
Recommended flow rates for home water systems

Number of bedrooms	Number of bathrooms in home			
	1	1-1/2	2	3
	Gallons per minute flow rate			
2	6	8	10	
3	8	10	12	
4	10	12	14	16
5		13	15	17
6			16	18

Table 3 gives farm water requirements. Use this information to determine peak use in gallons per day, then refer to Table 4 to read directly flow rate in gallons per minute.

Table 3
Approximate farm water requirements

Water use per animal	Gallons per day
Milk cow	35 to 45
Dry cow	20 to 30
Calves (1 to 1/2 gallons per 100 pounds body weight	6 to 10
Swine • Finishing • Nursery • Sow and litter • Gestating sow	 3 to 5 1 8 6
Beef animal	8 to 12
Sheep	2
Horse	12
100 chicken layers	9
100 turkeys	15
Water use for milk houses and parlors	
Washing operation	Water volume
Bulk tank • Automatic • Manual	 50 to 60 gallons per wash 30 to 40 gallons per wash
Pipeline in parlor (volume increases for long lines in a large stanchion barn)	75 to 125 gallons per wash
Pail milkers	30 to 40 gallons per wash
Miscellaneous equipment	30 gallons per day
Cow preparation	(gal per wash per cow)

• Automatic • Estimated average • Manual	1 to 4-1/2 2 1/4 to 1/2
Parlor floor	40 to 75 gallons per day
Milk house floor	10 to 20 gallons per day

Water use flow rates		
Air temperature, size of animal, species, age, milk or egg production, type of ration, dry matter consumed and other variables affect livestock water consumption. Average summer values are listed — use 60 percent for cool weather. Also use 60 percent of the tabulated livestock consumption for pond storage if the average year-round temperature is about 50 degrees Fahrenheit.		
	Minimum gallons per minute	**Preferred gallons per minute**
Automatic waterers cattle, hogs or sheep (20 to 40 head per bowl) poultry (100 to 150 layers)	1/2 1/4	2 1
Cleaning hose for milk house and dairy utensils	3	5
Cleaning and manure removal hose for milking barn or hog house	5	10
Outdoor hydrant for uses other than firefighting	3	5

Table 4
Flow rates for livestock production

Peak use	Flow rate
Up to 1,000 gallons per day	(minimum) 8 gallons per minute
1,500 gallons per day	12 gallons per minute
2,000 gallons per day	16 gallons per minute
2,500 gallons per day	20 gallons per minute
3,000 gallons per day	24 gallons per minute
4,000 gallons per day	28 gallons per minute
5,000 gallons per day	32 gallons per minute
6,000 gallons per day	36 gallons per minute

7,000 gallons per day	39 gallons per minute
8,000 gallons per day	42 gallons per minute
9,000 gallons per day	45 gallons per minute
10,000 gallons per day	48 gallons per minute
12,000 gallons per day	50 gallons per minute

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G1801, reviewed October 1993

Related MU Extension publications

- EQ378, Selecting a Site for Livestock and Poultry Operations
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=EQ378
- G1801, How to Size a Farm and Home Water System
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1801
- G6720, Home Lawn Watering Guide
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G6720
- WQ660, An Action Program for Safe Drinking Water
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=WQ660

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UNIVERSITY OF MISSOURI Extension

■ Issued in furtherance of the Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Director, Cooperative Extension, University of Missouri, Columbia, MO 65211
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