

UNIT VI - PLUMBING

Lesson 1: Water Needs

Competency/Objective: Calculate how much water is needed for a farmstead.

Study Questions

1. What are the sources of water on a farmstead?
2. What are the uses of water on a farmstead?
3. How is the total daily water need determined?
4. How is peak water need determined?

References

1. *Agricultural Structures (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999, Unit VI.
2. Transparency Master
 - a) TM 1.1: Water Needs Table
3. Activity Sheet
 - a) AS 1.1: Determining Water Needs

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TEACHING PROCEDURE

B. *Introduction*

Agricultural operations depend on their water supply for production. Determining which water sources are suitable for an operation and the volume of water required are essential to the success of the producer.

C. *Motivation*

Ask students if they know how much water each of them consumes (total water use) on a daily basis (approximately 50 to 100 gallons per day). Then ask them to list as many different uses of water in agricultural operations as they can. Can any operations exist without water?

D. *Assignment*

E. *Supervised Study*

F. *Discussion*

1. Ask students to list different sources of water with which they are familiar. Discuss the sources of water for agricultural operations.

What are the sources of water on a farmstead?

- a) Public water supply
 - 1) Provides a safe, dependable water supply
 - 2) Not available in all areas, making private water sources necessary
- b) Well
 - 1) Provides a large quantity of safe water with relatively little maintenance
 - 2) Either shallow or deep
 - (a) Shallow wells - sufficient water but poorer in quality
 - (b) Deep wells - cleaner water and usually a larger volume of water; more expensive to drill
- c) Cistern - stores rainwater for domestic use but may not supply enough for livestock
- d) Pond
 - 1) Natural or man made
 - 2) Supplies livestock with water
 - 3) Can be used for humans with the proper construction and purification
 - 4) Problem - protection from pollution
- e) Natural sources of water, such as creeks, streams, and springs
 - 1) May not be able to provide enough water to meet the needs of the operation
 - 2) Can be unreliable for most irrigation and animal needs because of flooding, droughts, and changing topography of water courses

2. Refer back to the motivation and discuss the uses of water that predominate at their homes or operations. Discuss the different uses.

What are the uses of water on a farmstead?

- a) Drinking water for livestock
- b) Irrigating crops

- c) Sanitation
 - d) Cooling systems in some types of facilities, such as greenhouses or hog facilities
 - e) As a delivery system, by adding fertilizer to water while irrigating or medication to animals' drinking water
 - f) Human use for various domestic purposes, if a home is located on the farmstead
3. Ask students how they would go about determining how much water an agricultural operation needs on a daily basis. Using TM 1.1, discuss the use of tables showing water needs for different applications. Point out that overestimating daily water needs is usually better than underestimating the amount.

How is the total daily water need determined?

- a) Find information on water needs.
 - 1) Charts that show the water needs for different types of animals and crops or special circumstances
 - 2) Local University Extension offices
 - 3) Trade associations
 - b) Multiply the recommended amount of water for a particular use by the amount of usage.
 - c) Add the different water uses together to find the total daily need of the operation.
4. Ask students how peak water need is determined. Have students complete AS 1.1.

How is peak water need determined?

- a) The volume of water a water source can deliver is usually measured in gallons per hour.
- b) Compare the total daily needs with the hourly output, which should be greater than the daily needs of the operation in order to meet peak water needs.

G. ***Other Activities***

Have students determine their water needs at home. Have them find out whether their water source is sufficient.

H. ***Conclusion***

Water, which may come from a variety of different sources, is a necessity for agricultural production. With a bit of calculating, a producer can estimate the amount that will be needed for his or her operation. This information can be useful when planning water systems.

I. ***Answers to Activity Sheet***

<u>Category</u>	<u>Water Needs</u>
Humans - 4 adults	400
25 beef cows	300
15 calves	150
4 horses	48
Lawn watered weekly - 1 inch (2,000 square feet)	1200
100 sows	800
Flushing the floor of the barn (400 square feet)	
	<u>40</u>
Total water needs	2938

1. No
2. 402 gallons
3. Drill another well, or reduce the number of hogs raised.

J. ***Answers to Evaluation***

1. c
2. a
3. Local University Extension offices and trade associations
4. Answers may include any three of the following: drinking water for livestock; irrigating crops; sanitation; cooling systems in some types of facilities; as a delivery system, by adding fertilizer to water while irrigating or medication to animals' drinking water; and use by humans for various domestic purposes, if a home is located on the farmstead.
5. By multiplying the recommended amount of water for a particular use by the amount of usage and adding the different water uses together to find the total daily need of the operation
6. By comparing the total daily needs with the hourly output

EVALUATION

Circle the letter that corresponds to the best answer.

1. Which of the following sources of water holds rainwater for domestic use?
 - a. Public water supplies
 - b. Wells
 - c. Cisterns
 - d. Springs

2. What is a potential problem in using a pond as a water source?
 - a. Pollution
 - b. Flooding
 - c. Maintenance
 - d. Water storage

Complete the following short answer questions.

3. What are two potential sources of information about water needs?
 - a.
 - b.

4. What are three uses of water by agricultural operations?
 - a.
 - b.
 - c.

5. How is the total daily water need calculated for an agricultural operation?

6. How is peak water need determined?

Water Needs Table

Use	Water Needs
Adult human	50 to 100 gallons per day
Beef animal	8 to 12 gallons per day
Milk cow	35 to 45 gallons per day
Dry cow	20 to 30 gallons per day
Calf	6 to 10 gallons per day
Swine (finishing)	3 to 5 gallons per day
Sow and litter	8 gallons per day
Horse	12 gallons per day
100 chickens (laying)	9 gallons per day
Lawn and garden	600 gallons to apply 1 inch of water on 1,000 square feet of area
Flushing floors	Minimum of 10 gallons per 100 square feet of floor

*Adapted from *How to Size a Farm and Home Water System (G1801)*, a University of Missouri Extension agricultural publication.

Lesson 1: Water Needs

Name _____

Determining Water Needs

Objective: Determine if the water supply is sufficient to supply this farm's water needs.

You are considering adding a 100-sow hog enterprise to your farm. One of your main concerns is whether the single well on the farm will be enough to supply the entire farm's needs, including the new hog operation. You will use water for the hogs and for flushing the floor of the barn. Your well provides 2,500 gallons. Using the information from the chart in the student reference, determine the total daily water needs for the farm. Use the maximum numbers for each category when determining your water needs. Then answer the questions below.

<u>Category</u>	<u>Water Needs</u>
Humans - 4 adults	_____
25 beef cows	_____
15 calves	_____
4 horses	_____
Lawn watered weekly - 1 inch (2,000 square feet)	_____
100 sows	_____
Flushing the floor of the barn (400 square feet)	_____
Total water needs	_____

1. Will your well supply enough water to add 100 sows?
2. How much extra water do you have without the hogs?
3. What are your alternatives for dealing with this water shortage?

