



Pork Prose
by
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WATER NEEDS FOR SWINE

Hog producers know that as a nutrient, nothing ranks higher than water.

From a practical sense, feed intake hinges on an adequate water supply. From a biochemical sense, virtually everything that happens in the body thrives on and depends on water.

Table 1: Daily water consumption by swine.

Pig Weight	Quarts/Day
Up to 30 Lbs.	1
30-80 Lbs.	2
80-130 Lbs.	5
130 Lbs. & Over	6

Pigs (and sows) on full feed should have free access to water to maximize feed intake. Water can be restricted somewhat for limit fed animals. For example, sows getting five pounds of feed per day need no more than three gallons of water under normal conditions. And some commercial feeding systems successfully combine limited access to both feed and water for growing-finishing pigs.

Number Of Waterers

Too many waterers are better than not enough. Pigs fight for the water fountain just as they do for the feeder.

A rough rule of thumb is to provide one waterer for every 10 to 15 pigs with a minimum of two per

Table 2: Effect Of Water Flow Rate and Number of Waterers on Finishing Pig Performance.

	Flow (cups/min)		Waterers/pen	
	1	4	2	1
ADG, lb.	1.56	1.61	1.62	1.55
ADF, lb.	5.65	5.74	5.74	5.65
F/G	3.64	3.57	3.55	3.65

(Adapted from Nebraska Swine Report, 1991, p. 22)

Research also shows that sows on restricted water flow (approximately 1/2 cup/min) tend to eat less and lose more weight during lactation than sows on a high flow rate (approximately 3 cups/minute). But a study conducted in Ottawa, Ontario showed no differences in water intake in lactating sows whether at a high (8.5 cups/minute) or low (2.5 cups/minute) flow rate. However, sows wasted

only 2.5 quarts per day on the low water flow rate vs. 8 quarts per day on the high flow rate.

Based on these studies, it appears that water flow rate for individually housed lactating sows should be at least 2.5 cups per minute. But there is little justification for flow rates greater than 4 cups (1 quart) per minute.

Listed below are some suggested values for water flow rates.

Table 3: Suggested water flow rates for various stages of production.

STAGE OF PROD	FLOW RATE
10-25 lbs	1 cup/min
25-50 lbs	2 cups/min
50-125 lbs	3 cups/min
125-market wt	1 quart/min
Sows and boars	1 quart/min
Lactating sows	1 quart/min

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Quantity

Pigs normally drink a little more than a quart of water with every pound of feed they eat. Hot weather, boredom, and high salt levels in the feed increase water needs.

High salt and mineral levels in the water may also increase consumption — to a point. If salt or mineral levels get too high, water intake will drop.

Some typical water consumption rates:

Type Of Waterer
The best waterer provides fresh water, requires little maintenance, and stands a lot of abuse. For most stages of production, it's tough to find a waterer that will do a better job than a nipple.

Sows housed in gestation stalls could also drink from a continuous concrete trough with a valve at one end. The only concern with continuous troughs is that some diseases (such as TGE or pseudorabies) are quickly spread in a trough.

For baby pigs, water isn't too important until they start consuming a significant amount of creep feed (three weeks for most operations). However, 1/2 inch nipples work well. Bowl or cup waterers, while less sanitary than nipples, probably have better acceptance with baby pigs.

Mounting The Waterer

Nipple waterers work nicely when mounted horizontally. Many folks suggest pointing the nipple down at a 45 degree angle to prevent wastage. I'm not convinced that will reduce wastage at all, but if nipples are mounted on an angle, they should be mounted an inch or two higher than the pig's back line.

A study from the University of Nebraska did find that pointing the nipple up on a 45 degree angle created clogging problems with the feed particles.

Water Quality

While this has been getting a lot of attention in recent years, effects of changes in water quality on pigs is still open to estimation.

Here are suggested quality val-

Toxic Metals

Table 4: Suggested maximum concentrations for toxic metals in water supplies for swine.

ELEMENT	MAXIMUM LEVEL, PPM
Aluminum	5
Arsenic	.5
Cadmium	.02
Copper	5
Lead	.1
Mercury	.033
Zinc	50
Calcium	1000

Source: Canadian Task Force on Water Quality (1987)

Commercial laboratories or your health department can usually assist in water analysis. Unless you see problems, annual checks for total dissolved solids, nitrates, total coliforms, and fecal coliforms are probably adequate.

Chlorination

Disinfection of water supplies for livestock is sometimes needed. Ultraviolet disinfection is adequate as long as the unit is designed for the relatively high flow rates often found with large animal operations.

Chlorination is another means of disinfection. Add enough chlorine to provide at least 1 ppm of free residual chlorine. One ppm will control bacteria, but you will need slightly higher levels to control Giardia and viruses if present.

Also, water with a pH higher than 7.5 will require at least 2 ppm of free chlorine to be effective. Be sure that the chlorine is in contact with the water for at least five minutes.

Stray Voltage

Under some conditions, the watering system may become electrically charged.

Because flooring is damp in swine facilities and because the pig is a good conductor of electricity,

ues (adapted from EPA standards, 1973 and the National Academy of Sciences, 1974). Many of the levels cited below will seem unusually high. Clearly, more research is needed.

Total Dissolved Solids (TDS, also total dissolved salts)— Avoid using water for swine when TDS levels exceed 5,000 parts per million (ppm). High levels are more of a problem during hot weather, pregnancy, and lactation. Watch for low consumption rates or milking problems. Sulfates can have a laxative effect. As little as 500 ppm of sulfates in the water can have adverse effects on weaning pigs and sow reproductive efficiency.

Total Coliforms — This is a measure of total E. Coli present in the sample. While all strains of E. Coli are not harmful, total coliforms provide an indicator of contamination. 5,000 coliforms/100 ml should be a maximum. If the value approaches this, look for sources of contamination.

Fecal Coliforms — These are the E. Coli bacteria originating from manure. Don't use the water for swine when fecal coliforms exceed 1,000/100 ml. High levels usually lead to diarrhea or mastitis problems.

Nitrates — This form of nitrogen can be tolerated at moderate levels by the pig. Some estimates place the maximum level at 440 ppm. I suggest that 100 ppm (23 ppm nitrate nitrogen) be the maximum level. Even at this level, the source of contamination should be located and contained if practical. Nitrites are much more toxic than nitrates. Nitrite level should not exceed 30 ppm. High levels can lead to stillborn pigs.

ment both operating and turned off.

The causes of stray voltage include:

- Unbalanced load in the electrical box. Check to see that the number of circuit breakers (and the current load) on each side of the box is roughly equal.

- A short circuit or faulty appliance. Check water pumps, heaters for waterers, drip cooling systems, feed auger motors, and limit switches in feeders. All should be properly grounded and functioning normally.

- Stray voltage through the neutral line. This current may originate from the power company or their equipment.

Although unrelated to water, it should also be noted that stray voltage can reach the pigs through feeding equipment or fences just as readily as it does through the watering system.

Stray voltage problems, with the help of an electrician or a power company representative, are usually easy to correct.

Remember that pigs consume more pounds of water each day than any other nutrient. Be sure you give it the attention it deserves.

References

- Chlorination of animal drinking water. Illinois Veterinary Bulletin. 1(1) 1993.
- Russett, J. C. 1987. Water needs for pigs. Swine Line. Vol 2, No 4.
- Brooks, P. H., J. L. Carpenter and J. Barber. 1992. Banff Pork Conference. Newton-Abbot, Devon, England.

Forestry Workshop Set

WILKES-BARRE (Luzerne Co.) — Urban and community forestry can make a difference in our lives. As we develop and apply technologies for a better way of life, often times side effects adversely affect our natural environment.

In many cases, the trees that help create liveable communities are taken for granted and fail to receive the maintenance they need to remain healthy.

On April 14, Penn State Cooperative Extension in cooperation with Penn College of Technology, the Pennsylvania Urban and Community Forestry Council, the Bureau of Forestry, and the Williamsport Shade Tree Commission will hold a seminar entitled "Promoting Tree Health: A Community Forestry Workshop."

This program will begin to address community forestry issues and examine ways of maintaining and promoting tree health in our communities.

If you are a municipal manager, green industry professional, or an individual concerned about the health of your community trees, this workshop is worth attending.

The workshops will be held at the Alvin C. Bush Campus Center at the Pennsylvania College of Technology in Williamsport. The registration fee is \$15 per person, which includes lunch and written materials.

Preregistration is required before April 8 (no walk-ins will be accepted).

For more information, call Luzerne County Cooperative Extension at (717) 825-1701 or (717) 459-0736 ext. 701.

pigs drinking from these systems will sense an electric shock.

Studies at the University of Minnesota show that 3.7 volts is enough to reduce water consumption by 25 percent. Many researchers and producers also feel that stray voltage through the watering system can lead to nervous behavior and cannibalistic vices such as tail biting.

Recently in southeastern Pennsylvania, a sow herd had recently been experiencing vaginal discharges during gestation, and a fairly high rate of abortions. Stray voltage was evident, and although the source could not be located, the problem was corrected with the installation of neutral ground isolator.

The vaginal discharges stopped with days of that installation, and the conception rate in the herd also improved markedly.

Stray voltage reaches the watering system since many electrical systems are grounded to an external ground and to a water pipe, and because much of the electrical equipment and fencing are interconnected. The stray voltage should be measured between the waterer and an external ground (driven in a damp area) at least 25 feet from the building. Measurement should be taken with equip-