Thank you for participating in SowBridge 2011-12.
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Water Use and Conservation at Breed to Wean Sites

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We heard about water use for evaporative pads last month

SowBridge
Proper Management and Maintenance of Cool Cells

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2 Issues of Concern with Water
1) Daily water needs – total usage per day
   Necessary for environmental permitting

Daily Water Needs

• Wean-Finish
  • Increases as feed intake increases, but curvilinear

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  • Increases as feed intake increases, but curvilinear
  • Modest seasonal wastage differences
  • Driven by water/feed ratio
Breeding Herd Water Needs

- Drinking water needs driven by:
  - Lactation – number of pigs suckling which impacts feed intake
  - Gestation – related to body size which has some relationship with feed intake

Why so much water for lactation?

- Sows milk ~ 82% water
- More milk today than previous
  - Better genetics
  - Ad lib feed intake vs 2x or 3x daily feeding
  - At high feed intakes - more metabolic products to excrete in the urine

Breeding Herd Water Estimates

- Gestation
  - 2-4 gal/female/day
  - Troughs filled 2x daily vs nipple drinkers in stalls

- Lactation
  - 6-9 gal/female/day
  - Estimates may be low for today’s feed intake
2 Issues of Concern with Water

1) Daily water needs – total usage per day

2) Instantaneous Delivery Rate
   - Can we meet the need at the moment?

Trough Systems for Gestation

- How long does it take to fill trough?
- How often to fill troughs?

- Signs of water limitation
  - Drinking for long periods when available
  - Lick or suck water from floor
  - Dam water in trough to gain more access
  - Increased vaginal discharges
  - Higher urine specific gravity

Pen Gestation

1 drinker/12-15 females

Let's do the math!

\[
\frac{3}{4}'' \text{ ID schedule 40 PVC pipe} \\
\text{Schedule 80 PVC required at } 5 \text{ ft/sec and higher flows} \\
= \frac{1}{4} \pi r^2 \times 4 \text{ ft/sec} \times 60 \text{ sec/min} \times 7.5 \text{ gal/ft}^3
\]

= 5.5 gal/min

0.375 in = 1.25 gal/min 23%
0.5 in = 2.5 gal/min 45%
0.625 in = 3.8 gal/min 69%
0.75 in = 5.5 gal/min 100%
1.0 in = 9.8 gal/min 178%
1.25 in = 15 gal/min 275%
1.50 in = 22 gal/min 400%
From May SowBridge

6" Pad System (75% Efficient) – Approximate Peak water evaporation GPM for every 20,000 CFM of Tunnel Air – Based on 2.5% weather data

250 cfm x 1150 females = 287,500 cfm max vent

Effect of pressure on flow

\[ \sqrt{\frac{P_1}{P_2}} = \sqrt{\frac{20 \text{ psi}}{40 \text{ psi}}} = 0.71 \]

Reducing pressure 50% reduces flow to 71% of original
Doubling pressure increases flow to 141% of original

Water Requirements- System Supply From May SowBridge

Assume House is located in Minnesota.
Peak Evaporation Rate = 0.84 GPM / 20,000 CFM

Follow manufacturers recommendations for water pressure

20 psi most drinkers
40 psi bladder drinkers

Common Restrictors of Water

5/8" x 1"
Filters need to be cleaned/flushed!

How fast should nipples flow in farrowing crates?

- Available evidence suggests 2 levels of water need
  - Survival/maintenance
  - Maximizing performance
- When flow is restricted
  - Sow will work hard enough to meet maintenance needs
  - Won’t work hard enough to meet milk needs
  - Some data suggests 20-30 min/d max time drinking
- **MINIMUM** flow of 4 cups/min
- No evidence to support higher than 8 cups/min flow

### When do lactating sows drink?

- **4.5 gld/crate/d**
- **12.5 gld/crate/d**

Red Line is 24 hr total – right axis scale
Blue line is 15 minute total – left axis scale
Dashed vertical line with date is 6 am
24 crate room

Data courtesy www.dicamusa.com

### What about gestation

#### March 2009
- Dashed vertical line with date is 6 am
- Drinking water ~ 15,000 gald
- Evaporative Pad water 0 gald
- Total water ~ 15,000 gald

Data courtesy www.dicamusa.com

#### August 2009
- Drinking water ~ 15,000 gald
- Evaporative Pad water 0-12,000 gald
- Total water as high as 30,000+ gald

Data courtesy www.dicamusa.com
What about water temperature?

- Black pipe is a solar heater
- Experience suggests water temps lower than body temp are preferred

<table>
<thead>
<tr>
<th>Lactation Water Temperature</th>
<th>~91°F</th>
<th>~59°F</th>
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</thead>
<tbody>
<tr>
<td>Daily water, gal/d</td>
<td>5.8³</td>
<td>6.3²</td>
</tr>
<tr>
<td>Daily feed, lb/d</td>
<td>10.1</td>
<td>10.3</td>
</tr>
<tr>
<td>Morrow et al. 2007. 12d</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is Stray Voltage?

Neutral-to-earth voltage is caused when electrical current flows between the grounded circuit conductor (neutral) and the earth. There is always some finite resistance between the grounded circuit conductor and the earth. The amount of current flow in amperes times the resistance in ohms will give the voltage. Neutral-to-earth voltage is a natural phenomenon of electrical current flow in a multi-grounded electrical system. It is always present at some level on a farm electrical system, and on a multi-grounded primary electrical distribution system.

Stray voltage is frequently defined as a special case of neutral-to-earth voltage. When the neutral-to-earth voltage is present across points on contact of an animal, such as from a water bowl to the floor in a dairy barn, it is called stray voltage.

Stray Voltage

- Sows more sensitive than growing pigs
- Generally associated with drinkers and sows standing on metal floors (farrowing crates)
- Sows in farrowing
  - Reluctant to drink
  - Don’t eat/milk well
  - Agitated
- Death loss in farrowing increased but no disease cause identified

Grounding Rod Connections

Sows in farrowing
- Reluctant to drink
- Don’t eat/milk well
- Agitated
- Death loss in farrowing increased but no disease cause identified

Updated National Electric Code reduces chances of this
- Older facilities or states without electric inspection requirement during construction – higher risk

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Stray Voltage

- Common Causes in Older Facilities
  - Faulty/missing ground rod connection
  - Corroded ground connections in hallway/room electric panels

- Prevention
  - Verify tight clamping of grounding wire to all ground rods
  - Maintain integrity of electric wiring

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What about quality?

- 3,000 ppm sulfates and/or 5,000 TDS
  - Transitional diarrhea
  - Black feces

- 100 ppm NO\textsubscript{2}-N (440 ppm NO\textsubscript{3}) – all pigs

- 450 ppm NO\textsubscript{3}-N (1,980 ppm NO\textsubscript{3}) – Gro-fin

- 1 coliform/100 ml considered acceptable
- 5 bacterial forming colonies (BFC)/100 ml
  - Immediate action

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"Even if you're on the right track, you'll get run over if you just sit there."

-- Oliver Wendell Holmes Sr. (1809-1894)