Poultry Farm Water Supply

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National Poultry Technology Center

Alabama Burglar & Alarm System

Industry Upgrades
• Ceilings, Sidewalls & Insulation
• Ventilation & Cooling
• Electrical
• Heating
• Feeders
• Drinkers
• Fans
• Water Supply
Commonly Asked Questions?

• How Much Water Does A Poultry House Use?
• How Much Water Does My Farm Use?
• What Size Should My Main Line Be?
• How Can I Tell If I Am Short on Water?
• I Ran Short Last Year – What Can I Do Now?
• Do I Need Storage Tanks?
• What Are My Alternatives?

What Do I Need to Know?

• Tunnel Capacity
• Pad Type
• # & Bird Size
• Other Water Needs
• # Houses
• Main Line & Meter
• Farm Layout
• Location
### Total Tunnel Fan Air Moving Capacity (ft³/min)

<table>
<thead>
<tr>
<th>Total Tunnel Fan Air Moving Capacity (ft³/min)</th>
<th>Pad System Max Water Usage (gal/min)</th>
<th>6” Pad</th>
<th>2” Fog Pad</th>
</tr>
</thead>
<tbody>
<tr>
<td>160,000</td>
<td>7.6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>180,000</td>
<td>8.5</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>200,000</td>
<td>9.5</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>220,000</td>
<td>10.4</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>240,000</td>
<td>11.3</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>260,000</td>
<td>12.3</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>280,000</td>
<td>13.2</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>300,000</td>
<td>14.2</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>320,000</td>
<td>15.1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>340,000</td>
<td>17</td>
<td>10.7</td>
<td></td>
</tr>
</tbody>
</table>

### Water Supply for the 6” Evaporative Cooling Systems

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>50%</th>
<th>40%</th>
<th>30%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°F</td>
<td>2.4</td>
<td>3</td>
<td>3.5</td>
<td>4.2</td>
</tr>
<tr>
<td>95°F</td>
<td>2.6</td>
<td>3.2</td>
<td>3.8</td>
<td>4.4</td>
</tr>
<tr>
<td>100°F</td>
<td>2.7</td>
<td>3.4</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td>105°F</td>
<td>2.9</td>
<td>3.6</td>
<td>4.2</td>
<td>5</td>
</tr>
</tbody>
</table>

100°F & 30% @ 100,000 CFM = 4 gpm
100°F & 30% @ 200,000 CFM = 8 gpm
House Size, Wind Speed, Tunnel CFM & Water for 6” Evaporative Cooling

40’ Wide @ 600 fpm = 228,000 CFM = 9 gpm
50’ Wide @ 600 fpm = 285,800 CFM = 11.2 gpm
60’ Wide @ 600 fpm = 342,000 CFM = 13.4 gpm
66’ Wide @ 600 fpm = 376,200 CFM = 14.7 gpm

Just for Recirculation Pads!

Water for the Birds

<table>
<thead>
<tr>
<th>Bird Age (Days)</th>
<th>Estimated Peak Water Usage (gal/min per 1,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>0.08</td>
</tr>
<tr>
<td>42</td>
<td>0.095</td>
</tr>
<tr>
<td>49</td>
<td>0.1</td>
</tr>
<tr>
<td>56</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Just for Recirculation Pads!
<table>
<thead>
<tr>
<th>Number of Birds/House</th>
<th>Estimated Per House Maximum (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000</td>
<td>1.5</td>
</tr>
<tr>
<td>20,000</td>
<td>2</td>
</tr>
<tr>
<td>25,000</td>
<td>2.5</td>
</tr>
<tr>
<td>30,000</td>
<td>3</td>
</tr>
<tr>
<td>35,000</td>
<td>3.5</td>
</tr>
<tr>
<td>40,000</td>
<td>4</td>
</tr>
<tr>
<td>45,000</td>
<td>4.5</td>
</tr>
<tr>
<td>50,000</td>
<td>5</td>
</tr>
</tbody>
</table>

**House Size & Water for Birds**

40’ x 500’ = 20,000 ft² @ 0.70 dens. = 28,600 birds
28.6 / 0.10 ≈ 2.9 gpm

50’ x 500’ = 25,000 ft² @ 0.70 dens. = 35,700 birds
35.7 / 0.10 ≈ 3.6 gpm

60’ x 500’ = 30,000 ft² @ 0.70 dens. = 42,857 birds
42.9 / 0.10 ≈ 4.3 gpm

66’ x 500’ = 33,000 ft² @ 0.70 dens. = 47,142 birds
47.1 / 0.10 ≈ 4.7 gpm

**Just for the Birds!**

<table>
<thead>
<tr>
<th>House Size &amp; Fan Capacity (CFM)</th>
<th>Est. Peak for 6” Pad System (gpm)</th>
<th>Est. Peak for Birds @ 0.70 Density (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40’x500’ @ 228,000</td>
<td>9</td>
<td>2.9</td>
</tr>
<tr>
<td>50’x500’ @ 285,000</td>
<td>11.2</td>
<td>3.6</td>
</tr>
<tr>
<td>60’x500’ @ 342,000</td>
<td>13.4</td>
<td>4.3</td>
</tr>
<tr>
<td>66’x600’ @ 376,000</td>
<td>14.7</td>
<td>4.7</td>
</tr>
<tr>
<td>House Size &amp; Fan Capacity (CFM)</td>
<td>Pads &amp; Birds Per House (gpm)</td>
<td># Houses on Farm</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>40’x500’ @ 228,000</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>50’x500’ @ 285,000</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>60’x500’ @ 342,000</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>66’x600’ @ 376,000</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>House Size &amp; Fan Capacity (CFM)</th>
<th>Est. Total Farm Demand (gpm)</th>
<th>4 house Supply Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>40’x500’ @ 228,000</td>
<td>48</td>
<td>2”</td>
</tr>
<tr>
<td>50’x500’ @ 285,000</td>
<td>60</td>
<td>2”</td>
</tr>
<tr>
<td>60’x500’ @ 342,000</td>
<td>72</td>
<td>2.5”</td>
</tr>
<tr>
<td>66’x600’ @ 376,000</td>
<td>80</td>
<td>2.5”</td>
</tr>
</tbody>
</table>

**Minimum Pipe Size**

Flow Velocity Below 6 fps

<table>
<thead>
<tr>
<th>Flow Rate (gal/min)</th>
<th>Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 or less</td>
<td>¾”</td>
</tr>
<tr>
<td>16 or less</td>
<td>1”</td>
</tr>
<tr>
<td>36 or less</td>
<td>1 ½”</td>
</tr>
<tr>
<td>60 or less</td>
<td>2”</td>
</tr>
<tr>
<td>90 or less</td>
<td>2 ½”</td>
</tr>
<tr>
<td>140 or less</td>
<td>3”</td>
</tr>
</tbody>
</table>
Example: (4) 40' Plumbing Design

DEMAND = 48 GPM

A = 48 GPM = 2"
B = 24 GPM = 1.25"
C = 12 GPM = 1"

Example: (4) 40' Plumbing Design

DEMAND = 48 GPM

A = 48 GPM = 2"
B = 24 GPM = 2"
C = 12 GPM = 2"
DEMAND 48 GPM
A = 48 GPM = 2” = 17.4 psi loss
B = 24 GPM = 2” = 1.6 psi loss
C = 12 GPM = 2” = 0.036 psi loss
Total PSI Loss = 19.036

DEMAND 48 GPM
A = 48 GPM = 2” = 17.4 psi loss
B = 24 GPM = 2” = 1.6 psi loss
C = 12 GPM = 2” = 0.036 psi loss
Total PSI Loss = 19.036

CR = 60 psi
Start = 80 psi

Water Meter Sizing

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Max GPM Rating</th>
<th>PSI Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8”</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>¾”</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>1”</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>1 ½”</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>2”</td>
<td>160</td>
<td>20</td>
</tr>
</tbody>
</table>
### DEMAND 48 GPM

- \( A = 48 \text{ GPM} = 2'' = 1,000' = 17.4 \text{ psi loss} \)
- \( B = 24 \text{ GPM} = 2'' = 350' = 1.0 \text{ psi loss} \)
- \( C = 12 \text{ GPM} = 2'' = 30' = 0.036 \text{ psi loss} \)

Total PSI Loss = 19.036

![Diagram](image)

### 6" Cooling System Supply

- 250' Pipe @ 9 gpm
- \( \frac{1}{2}'' \) PVC = 63 psi loss
- \( \frac{3}{4}'' \) PVC = 16 psi loss
- 1" PVC = 5 psi loss

CR = 60 psi

Start = 80 psi

1" Meter = 65 psi

### DEMAND 48 GPM

- \( A = 48 \text{ GPM} = 1.5'' = 50.0 \text{ psi loss} \)
- \( B = 24 \text{ GPM} = 1.5'' = 5.3 \text{ psi loss} \)
- \( C = 12 \text{ GPM} = 1.5'' = 0.13 \text{ psi loss} \)

Total PSI Loss = 55.43

![Diagram](image)
DEMAND 48 GPM

A = 48 GPM = 1.5" = 50.0 psi loss
B = 24 GPM = 1.5" = 5.3 psi loss
C = 12 GPM = 1.5" = 0.13 psi loss
Total PSI Loss = 55.43

Start = 80 psi
1" Meter = 65 psi

CR = 24.6 psi
CR = 9.57 psi

CR = 24.6 psi
CR = 9.6 psi
+ CR = 22.7 psi

Start = 80 psi
1" Meter = 65 psi
+ 2" Meter = 78.1 psi

CR = 24.6 psi
CR = 9.6 psi
+ CR = 42.17

Start = 80 psi
1" Meter = 65 psi
Pushing Water Up Hill

50' Elevation x 0.433 = 21.7 psi loss

Water Meter

Feet x 0.433 = Pressure Loss

Poultry House

Water Consumption Chart

- Highest 24 hr
- Summer
- Watch For?
- Average
- Put Meter on Pad Supply Line?

Storage Capacity

- 56 x 600 house
- Birds = 3,300 gal
- Pads = 3,500 gal
- Store for Birds
- One Rule of Thumb = 100 gal/1,000 birds
- 32,000 / 1,000 = 32 x 100 = 3,200 gallons
- Limiting Factors
Water Storage Tanks

- GET THROUGH HOT DAYS
- PUMP AT NIGHT
- HOW MUCH?
- CUSTOM

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### HISTORY VIEW

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Humidity Water In Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16:00</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td>15:00</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td>14:00</td>
<td>2.15</td>
</tr>
<tr>
<td></td>
<td>13:00</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>12:00</td>
<td>2.47</td>
</tr>
<tr>
<td></td>
<td>11:00</td>
<td>2.83</td>
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<tr>
<td></td>
<td>10:00</td>
<td>3.18</td>
</tr>
<tr>
<td></td>
<td>09:00</td>
<td>3.72</td>
</tr>
<tr>
<td></td>
<td>08:00</td>
<td>4.25</td>
</tr>
<tr>
<td></td>
<td>07:00</td>
<td>0.53</td>
</tr>
</tbody>
</table>

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### PSI LOSS ACROSS 1" WATER METER

- 15 PSI LOSS
- 50 GPM
- 60 PSI
- 45 PSI
- MUNICIPAL SOURCE
- 1" WATER METER
- GROWER'S PVC PIPE TO HOUSES

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PSI LOSS ACROSS TWO PARALLEL 1” WATER METERS

- 25 GPM
- 60 PSI
- 25 GPM

SOURCE

- 3.6 PSI LOSS
- 25 GPM

TWO - 1” METERS

GROWER’S PVC PIPE TO FARM

- 50 GPM
- 55.4 PSI

- 60 PSI

- 25 GPM

- 50 GPM

- 55.4 PSI
Most Common Problems

- Poor Planning
- Undersized Meters
- Undersized Main Line
- Distance Between Farm and Main
- Elevation Change
- No Municipal Supply
- Insufficient Well Capacity
- Drinker System Neglect
- Not Checking for Water Avail. Before Building
- Too Many Houses
- Adding Houses
- Retrofitting Beyond Water Capacity
- Ponds = Quality = Filters
- No Testing Program
- No Backup Program

Water Supply Testing

- Digital Meters
- Bucket Test
  - 5 gal in 10 sec = 30 gpm
  - 5 gal in 15 sec = 20 gpm
  - 5 gal in 30 sec = 10 gpm
- Houses Off
- Houses On

Pressure Testing
Example: Water Supply Test

Water Supply Test
Summary

• Water is Just as Important as Electricity
• Example
• Retrofitting to Increase Windspeed = Fans + Pad + Water
• Water Costs Are Increasing = $7.68/1,000gal
• Every Farm is Different
• Remember the 7 P’s – & Test It

Thank You

Questions & Comments?

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