**Campbell Farm**

- (4) 40x500
- 2nd Controller
- Solid Walls
- 700fpm
- 4th Set Drinkers

---

**Jess’s ROI Priorities**

1. Air Leaks
2. Insulation
3. Stir Fans
4. Drinkers
5. LED Lights

---

**1. Air Leaks**

**Definition:** any uncontrolled air passage in or out

**Problems associated:**

1. Works against environmental control
2. Chill chicks and chickens
3. Cause longer heater zone run times
4. Increase fuel use
5. Rodents access into building
6. Cause need increased for ventilation time
7. Colder sidewalls and floors along wall
8. Wetness under drinkers

---

**Example Floor Temperatures**
Example Air Leak

House Tightness Test

- Close Up The House
- Turn On 1 cfm/sqft
- 20,000 sqft = 20,000 cfm
- 16,000 sqft = 16,000 cfm
- 0.10” in high ceiling
- 0.15” in low ceiling
- 0.20” in new dropped ceiling

Leakage Area vs. Static Pressure

- OLD
  - 0.01” = 60 ft²
  - 0.02” = 45 ft²
  - 0.03” = 30 ft²
  - 0.04” = 28 ft²
  - 0.05” = 25 ft²
  - 0.06” = 21 ft²
  - 0.07” = 20 ft²
  - 0.08” = 18 ft²
  - 0.09” = 17 ft²
  - 0.10” = 16 ft²

- IMPROVED
  - 0.11” = 15 ft²
  - 0.12” = 14 ft²
  - 0.13” = 13 ft²
  - 0.14” = 12 ft²
  - 0.15” = 11 ft²
  - 0.16” = 11 ft²
  - 0.17” = 10 ft²
  - 0.18” = 10 ft²
  - 0.19” = 9 ft²
  - 0.20” = 9 ft²
  - 0.21” = 8 ft²
  - 0.22” = 8 ft²
  - 0.23” = 7 ft²
  - 0.24” = 6 ft²
  - 0.25” = 6 ft²
  - 0.26” = 6 ft²
  - 0.27” = 5 ft²
  - 0.28” = 5 ft²
  - 0.29” = 4 ft²
  - 0.30” = 4 ft²

- NEW
  - 0.10” = 16 ft²

Air Leak Checklist

- Curtains
- Tunnel Doors
- End Wall Doors
- Baffles (inlets)
- Attic Inlets
- Fan Shutters
- Sill Plate
- Bottom of Wall
2. Insulation

**Definition:** material used to reduce heat transfer

**Problems Associated (lack of):**
1. Increased heat loss from house
2. Increased heating system run times
3. Increased fuel bills
4. Causes grower to reduce ventilation
   1. Results in poor AQ, wet litter, bird

**Thermal Image of Shifted Attic Insulation**

**Heat Loss Example:**
- 6-foot x 250-foot bare spot
- 1 gallon of gas per hour

**Ceiling Insulation Has Shifted**

**Old vs. Reblown Fiberglass**
Blown Fiberglass Insulation

- $0.16-$0.20 ft²
- $3,200 - $4,000/house

Thermal Camera Options

Two Thermal Image Examples

Example Spray Foam Video

Spray Foam Insulation R-7/inch

- ≥ 3# foam
3. Stir Fan Systems

- Cost = $120 - $200 each
- 18-20” Baskets
- 40x500 = 4 in front & 4 in back
- Management
  - Preheat
  - Brood
  - Until Vent Run on Temp
  - Between Flocks?

40 x 500 w/ 18-20” Basket Fans

- 40 x 500 = 20,000 ft² x 9.5 = 190,000 ft³
- 190,000 ft³ x 10% = 19,000 ft³ of air
  - 19,000 ft³ / 2,500 cfm fan = 7.6 fans or 8
  - Alternate Spacing/Arrangement Acceptable

40 x 500 w/ 18-20” Basket Fans

- Example Layout Using Only 6 Fans

Questions about solid walling and tunnel doors?
Questions about tube heaters?
**Tube Heaters & Circulation Fans**

- **40 x 500 w/ 18-20” Basket Fans**
  - $40 \times 500 = 20,000 \text{ ft}^2 \times 9.5 = 190,000 \text{ ft}^3$
  - $190,000 \text{ ft}^3 \times 10\% = 19,000 \text{ ft}^3$ of air
  - $19,000 \text{ ft}^3 / 2,500 \text{ cfm fan} = 7.6$ fans or **8**
  - Alternate Spacing/Arrangement Acceptable

---

**4. Drinkers**

**Problems:** *(Don’t Under Estimate)*
- EC: Litter, Ammonia, AQ, Bird
- EE: Fuel, Electricity and Feed

**Solution:**
- Inspect Before/During Every Flock and Monitor

**Priorities:**
- Water Quality, Clean, Nipples, Pressure, Adjustments

**Tools:**
- Meters, RH%, and Water Sample

*If drinkers are 7-10 years old and leaking it is time!*
5. LED Lights

Steps for Success
1. Bulbs ≈ $6.50 - $8.00 each
   (Buy 12 extra bulbs and store them)
2. Dimmer ≈ $350.00 each
3. Keyless Sockets ≈ $4.50 each
4. Electrician ≈ $50.00/hr

Low-Cost Retrofit Broiler House Layout

Better Non-Standard Retrofit Broiler House Layout

~Annual Power Cost Of Broiler House Grow Lights

<table>
<thead>
<tr>
<th>Bulb Type</th>
<th>Power Used (W)</th>
<th>Power Rate/kWh</th>
<th>Cost @ 4500 Hours Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 W Inc</td>
<td>100</td>
<td>$0.08</td>
<td>$0.08</td>
</tr>
<tr>
<td>75W Inc</td>
<td>75</td>
<td>$0.10</td>
<td>$0.10</td>
</tr>
<tr>
<td>60W Inc</td>
<td>60</td>
<td>$0.12</td>
<td>$0.12</td>
</tr>
<tr>
<td>10W LED</td>
<td>10</td>
<td>$0.14</td>
<td>$0.14</td>
</tr>
<tr>
<td>8W CCFL</td>
<td>8</td>
<td>$0.16</td>
<td>$0.16</td>
</tr>
<tr>
<td>6W LED</td>
<td>6</td>
<td>$0.18</td>
<td>$0.18</td>
</tr>
</tbody>
</table>
~Annual Power Cost Of Broiler House Grow Lights

1 Bulb @ 4,500 Hours Per Year

<table>
<thead>
<tr>
<th>Bulb Type</th>
<th>Power Used (W)</th>
<th>$0.08</th>
<th>$0.10</th>
<th>$0.12</th>
<th>$0.14</th>
<th>$0.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>60W Inc</td>
<td>60</td>
<td>$21.60</td>
<td>$27.00</td>
<td>$32.40</td>
<td>$37.80</td>
<td>$43.20</td>
</tr>
<tr>
<td>10W LED</td>
<td>10</td>
<td>$3.60</td>
<td>$4.50</td>
<td>$5.40</td>
<td>$6.30</td>
<td>$7.20</td>
</tr>
</tbody>
</table>

Savings per socket = $22.50 $27.00 $31.50

~Annual Power Cost & Savings Estimates For Broiler Lights – 40’X 500’

Cost/Year = #Bulbs*Watts/1000*Hours/Yr*Per kWh Rate

<table>
<thead>
<tr>
<th>Bulb Type</th>
<th>Number</th>
<th>Watts Per Hr</th>
<th>Power Rate</th>
<th>Annual Cost①</th>
<th>Annual Savings</th>
<th>Repl. Cost</th>
<th>Years Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>100W Inc</td>
<td>50</td>
<td>5,000</td>
<td>.12</td>
<td>$2,700</td>
<td></td>
<td>$25</td>
<td>0.5</td>
</tr>
<tr>
<td>75W Inc</td>
<td>50</td>
<td>3,750</td>
<td>.12</td>
<td>$2,025</td>
<td>$675</td>
<td>$25</td>
<td>0.5</td>
</tr>
<tr>
<td>60W Inc</td>
<td>50</td>
<td>3,000</td>
<td>.12</td>
<td>$1,620</td>
<td>$1,080</td>
<td>$25</td>
<td>0.5</td>
</tr>
<tr>
<td>10W LED</td>
<td>50</td>
<td>500</td>
<td>.12</td>
<td>$270</td>
<td>$2,430</td>
<td>$500</td>
<td>5-9</td>
</tr>
<tr>
<td>8W CC</td>
<td>50</td>
<td>400</td>
<td>.12</td>
<td>$216</td>
<td>$2,484</td>
<td>$400</td>
<td>1-2</td>
</tr>
<tr>
<td>6W LED</td>
<td>50</td>
<td>300</td>
<td>.12</td>
<td>$162</td>
<td>$2,538</td>
<td>$400</td>
<td>5-9</td>
</tr>
</tbody>
</table>

Jess’s ROI Priorities

1. Air Leaks
2. Insulation
3. Stir Fans
4. Drinkers
5. LED Lights

Winter 2005

Thanks & Good Luck This Winter