Ventilation in 45 minutes or less!!!!

Scott Black
Technical Services Manager
North America
Scott.Black@Cobb-Vantress.com
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MORE THAN 340,000 CIRCULATION

THIS MONTH!

One Giant Heater Broods 2,000 Chicks

Explain in Neal Brown’s Article, "Duck Breeding Systems Cut Costs"

Vaccinate to Prevent Fowl Pox Infection

Read how to vaccinate using the stab and follicle methods.

Lights Jump Egg Yield for the Kings

Black production increases after installation of home light plants.

It Pays to Understand the Produce Man

J. H. Florea made a special trip to the Chicago market to get valuable tips for Tribune readers.

Farm Hatchery Educates Her Children
What has changed??

1) Technology, better and better
2) Environmental Regulations
3) Production Costs, Feed, Fuel, Electricity, Water
4) Reactivity- Changes have to be made today
5) Liveability and Condemns.
## Cobb500™ Improvement
### SR Broiler 42 Days of Age

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<thead>
<tr>
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<tbody>
<tr>
<td>Wgt (g)</td>
<td>1135</td>
<td>1588</td>
<td>2042</td>
<td>2495</td>
<td>2948</td>
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<tr>
<td>Wgt (lb)</td>
<td>2.50</td>
<td>3.50</td>
<td>4.50</td>
<td>5.50</td>
<td>6.50</td>
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Cobb500™ Improvement
SR Broiler 42 Days of Age

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<tbody>
<tr>
<td>Yield%</td>
<td>64.0</td>
<td>67.0</td>
<td>70.0</td>
<td>74.0</td>
<td>78.0</td>
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<tr>
<td>Breast%</td>
<td>12.2</td>
<td>15.2</td>
<td>19.2</td>
<td>23.2</td>
<td>27.2</td>
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<tr>
<td>Fat%</td>
<td>2.10</td>
<td>1.90</td>
<td>1.70</td>
<td>1.50</td>
<td>1.30</td>
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## FCR Changes

### Progressive Genetics Change

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FCR</th>
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<tr>
<td>1987</td>
<td>2.00</td>
</tr>
<tr>
<td>1989</td>
<td>1.95</td>
</tr>
<tr>
<td>1991</td>
<td>1.90</td>
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<tr>
<td>1993</td>
<td>1.85</td>
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<td>1995</td>
<td>1.80</td>
</tr>
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<td>1997</td>
<td>1.75</td>
</tr>
<tr>
<td>1999</td>
<td>1.70</td>
</tr>
<tr>
<td>2001</td>
<td>1.65</td>
</tr>
<tr>
<td>2003</td>
<td>1.60</td>
</tr>
<tr>
<td>2005</td>
<td>1.55</td>
</tr>
<tr>
<td>2007</td>
<td></td>
</tr>
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<td>2009</td>
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**FCR**: 1 to 2 points / year
Intensities:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, October 18, 2012
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC
Outline of Presentation

• Minimum Ventilation

• Moisture vs Temperature Control

• Ammonia, CO2

• Equipment
What is Minimum Ventilation?

- Operates IF house Temp. Below SET POINT.
- 5 Minute Cycle Timer
- Responsible for **AIR QUALITY**
- Provide the required **OXYGEN**
- **Air Speed < 0.3m/s**
- Minimum run time: 60s - for air and heat distribution
Outline of Presentation

• Minimum Ventilation by definition:

is the least amount of cool air brought into the house to optimize good quality air for the birds without compromising the house temperature. (Cost Effectively)

Here is how we do it.........
First getting it wrong!

High mortality!
First getting it wrong!

(A): 19-day-old broiler. Eyelids are swollen, reddened and closed shut. (B), (C): 26-day-old broilers. Eyelids are swollen, deformed and almond shaped in (B) and they are tightly closed in (C).
First getting it wrong!

Most important investment in our chicken houses is the ventilation control.
Poor litter, cold birds, more stress, more mortality, higher energy costs, higher feed conversion
Ideal air flow for negative ventilation

Hottest air in the house

RH-25%, 27°C
RH-50%, 16°C
RH-75%, 10°C
RH-100%, 4°C

Oxygen at bird level, floors dry and heating costs low
If a squeezed handful of litter sticks together in a lump or ball, it’s too wet.
What the bird needs 24/7

- Oxygen content of house air > 19.6%
- Carbon dioxide content of house air < 0.3% (= 3000 ppm)
- Carbon monoxide content of house air < 10 ppm
- Ammonia content of house air < 10 ppm
- Dust content in house air that can be breathed in < 3.4 mg/m³
- How many sensors do we need in a house to monitor all these?
How many sensors are there in a chicken house???????
Every bird is a sensor!!!!!

- Chick behavior
  - Chicks should always be doing the following
    - Some eating
    - Some drinking
    - Some resting
    - Some playing
    - Evenly spread throughout the house
    - You should hear the birds before you open the door
    - For the first two weeks the chicken house should be too warm for the farmer—if not than the temperature is likely too low for the chicks

- Stockman ship is being able to understand the birds (the sensors)

- Good management is reacting to the birds (the sensors)
A chick’s respiratory system works at near full capacity at “set point”.

Ascites symptoms: needs only a 5% increase in demand.
Oxygen

- Increasing ventilation levels too much will lead to the heaters running more and burning more oxygen.

- If increased ventilation leads to drafts, this chills the chick and increases even more the birds oxygen need.
Effects of High CO$_2$ Level

- Will reduce activity
- Reduced feed/water consumption
- Increased incidence of dehydration
- Lower weight gain
- Increased incidence of right ventricle failure—later in life (Ascites)
## Ammonia Levels

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<table>
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<tbody>
<tr>
<td><strong>Target</strong></td>
<td><strong>&lt;10ppm</strong></td>
</tr>
<tr>
<td><strong>Humans detect</strong></td>
<td><strong>5 - 50ppm</strong></td>
</tr>
<tr>
<td><strong>Eye damage</strong></td>
<td><strong>45 - 100ppm (12hr exposure)</strong></td>
</tr>
</tbody>
</table>
Ammonia

• Once you have high Ammonia levels it is very costly to ventilate your way out!

• The purpose of ventilation is not NH$_3$ removal!
  – Minimum ventilations primary role:
    • Moisture removal
    • Oxygen supply
Outline of Presentation

- Humidity
Humidity???

• How is Humidity produced in a controlled environment?
  – Heaters
  – Drinkers
  – Outside factor
  – Birds
  – Behind the numbers….
Humidity in the House

• Assume that 20,000 market age birds weigh 5.0 lbs.
• Each bird retains 20% of the water consumed. Where does the rest go?
• Secretion, respiration, BTU production.
• So does that water just go away?
• Here are the numbers
Behind the Numbers

20,000 market age birds

• 2,100 gallons consumed
• 20% retained = 420 gallons
• Removal needed = 1,680 gallons
• If we don’t ventilate adequately, then the floor will absorb and the air will be saturated. Creating respiratory challenges.
Example of importance of air exchange

• Following example-winter time brooding
• Heating forced air heating
• Carbon dioxide measure every minute for ten minutes
• Relative humidity measured every minute
• All measurements taken at floor (chick) level
<table>
<thead>
<tr>
<th>Minutes fans off</th>
<th>CO2-ppm</th>
<th>Relative humidity-%</th>
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<tbody>
<tr>
<td>0</td>
<td>2,200</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>2,250</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>2,350</td>
<td>38</td>
</tr>
<tr>
<td>3</td>
<td>2,500</td>
<td>41</td>
</tr>
<tr>
<td>4</td>
<td>2,700</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>2,950</td>
<td>50</td>
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<tr>
<td>6</td>
<td>3,250</td>
<td>56</td>
</tr>
<tr>
<td>7</td>
<td>3,600</td>
<td>63</td>
</tr>
<tr>
<td>8</td>
<td>4,000</td>
<td>71</td>
</tr>
<tr>
<td>9</td>
<td>4,450</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>4,950</td>
<td>90</td>
</tr>
</tbody>
</table>
What is Required?

First stage minimum ventilation:
• The capacity of fans on the timer should be able to give a total air exchange every eight minutes.

The timer cycle:
• The minimum run time on the system must be at least 20% of the time:
  – 5-minute cycle: 1 minute on - 4 minutes off.
• Anytime the air quality begins to deteriorate there must be run time added to the cycle with the total cycle remaining the same. When time is added, the total cycle should remain the same.
Adjusting Minimum Ventilation

- Increase cycle timer first, then add a fan and open vent boards to maintain a 2 inch opening.

- Make small adjustments (10-30 sec / 5 min)

- Timer should be increased according to air quality (CO2 levels)

- Always have 2 inch opening during your minimum ventilation cycle and let the vents open as more fans come on.
Outline of Presentation

- Inlets
Proper Opening

PROPER AIR INLET OPENINGS
FOR BEST AIRFLOW AND MIXING

SIDEWALL INLET SHOULD OPEN ABOUT 1½” – 2”

CEILING INLET SHOULD OPEN ABOUT 1” – 1½”

Good static pressure is critical for proper airflow. Too wide air inlet openings cause static pressure to drop and allow air to drop onto birds. Too narrow openings cause static pressure to rise too high and choke off airflow.
Closing off side wall vents

MATCH AIR INLETS TO FANS FOR CORRECT STATIC PRESSURE
TYPICAL: OPEN 15 INLETS FOR EACH FAN (20,000 CFM)

A rule of thumb is to unlatch about 15 air inlets for every 48-inch fan that will be brought on. At the beginning of a growout, half of the inlets in the brood chamber and all inlets in the growout end may be latched closed.
Minimum & Transition Inlets

• All inlets match fan capacity and work in stages.
  – Only use all the side wall inlets during full transition.

• Always pressure controlled.
Minimum Ventilation Inlets

- Most important part of the ventilation system!
- Role:
  - Air & heat distribution
  - Cooling
- Many types of inlets
- Many inlet controls
- Best design?
  - Box type that is recessed into the wall.
  - Seals on the sides and base!
In minimum ventilation the air is directed away from the chicks and so chilling is avoided. When the birds are older than twenty five days of age and the temperature is greater than 25c the inlet directs the air across the birds, used in transitional ventilation. Needs controller—often stretch and uneven opening.
Too small Inlet opening (< 2.5 cm) allows less air volume to enter the house and less distance through the house.
Larger Inlet opening allows more air volume enter the house and move further through the house (operate the house as low pressure as possible to maximize fan volume and air distribution)-2.5cm
Ceiling (Attic) Inlet

- Early stages – couple of design options: 2 or 4 way
- Draw air into the house through the attic – warm cold outside air.
- **Energy savings: 10 – 20%**
- Winter conditions: ceiling inlets can accommodate 20% more ON time, at no extra cost – dry floors
Ceiling (Attic) Inlet

• The newer 4 way inlet has good air distribution.
• 2 way inlet can cause cold draughts along the side walls!
Seal the House up Tight

In cold weather only the minimum fans should be left uncovered/sealed
Air Leakage From end door
Air is one of the best insulators.

- Curtain inside and outside.
- 18-24 inches of air
- 2 barriers
- Inexpensive
- Easily made
Where to seal?

- Seal from the “bottom up”
- Doors-end/side doors
- Fans-especially large fans
- Inlets-especially tunnel inlet
- Roof-heat loss-most expensive
- Bottom of curtains
Sealing Curtains

- Identify leaks
- Air leaks around curtains
- Tighten up straps
- Smoke both high and low
- Don’t wait till February
Outline of Presentation

• Keeping your floors dry
• Timeline
• Identification
Floors!!!!

- If your litter clumps. When did it happen
- How long will it take to dry out
- Keeping birds to long in Brood Chamber
How to Keep Floors Dry?

• Reduce Humidity!
• 1°C increase = 5%RH reduction
• Heated air expands & holds more moisture.
• Take advantage of higher temp & low RH days!
How To Remove Humidity

• Warming air by 20 degrees decreased moisture by 50%.
• Getting the air to reach the apex of the roof will allow cooler air to mix with warmer air to remove moisture.
• Stir fans will mix warm and cool air to accomplish the same goal.
Things to Remember...

• 1) Add vents only when you add fans
• 2) Increase time weekly.
• 3) Vents by definition
• 4) When to use all vents
• 5) Sensors
• 6) Check air quality early in the morning and make adjustment.
Things to Remember

- 5 BTU’s per bird.
- Actual Temp needs to be 2 degrees below target to ensure the best air quality.
- Ventilate, Ventilate, Ventilate
- Educate, Educate, Educate
What’s your Program?
Now What’s your Program
Thank you very much!!!

• Questions???