GETTING BACK TO THE BASIC’S
WHAT WE HAVE LEARNED THIS WINTER

Bob Rochelle
BROILERS

Brooding equipment

Do we have enough BTU’s in houses

How many BTU’s per square foot do we actually need

What type of brooders
VENTILATION

Vent door management

Number of vent doors

Why?

Vent door openings
MINIMUM VENTILATION

You must create proper partial vacuum so air comes in with sufficient speed through all inlets.

Inlets should be distributed evenly along the entire length of the house.

Static pressure should be run at 0.10 in to 0.12 in (2.0 to 2.5 mm) of water with sidewall vents open 2 1/2 - 3 in wide (5.1 - 7.6 cm), ceiling vents 1 inch wide.

- Allows air to come into the house with enough volume and speed to mix with warm in-house air above the flock.
- Incoming air doesn’t drop directly onto chicks.
  - No chilling.
BREEDERS

PULLET HOUSING

Number of BTU’s per square foot
In the majority of pullet houses we have less BTU than the majority of broiler houses

A number of pullet houses don’t have any heat in the non brood end
House tightness is a huge problem, we require broiler housing to pull at least a .12 inches with 20,000 cfm

A large majority of hen houses will not pull .12 inches with 40,000 cfm
BREEDERS

Pullet Housing with no inlets only crack ventilation or air cannons

?
Modern Auburn House - 1934
Solid Sidewalls

Solid Double Decker-VA

Solid Sidewall-PA

Metal Plus Solid-GA
Internationally - Wide Housing is the Trend
Russian Trend Was House “Stacking”
KEYS TO ENVIRONMENT & PERFORMANCE

- It is all about confinement $$$
- Controlling heat balance of the bird
- Controlling heat balance of the building
- Controlling moisture balance of the building
- Provide best conditions for bird performance
IN CONFINEMENT POULTRY HOUSING

BUILDING CHARACTERISTICS

E-ORIENTATION
E-CONSTRUCTION
E-WALL TYPE
E-CURTAIN
E-INSULATION
E-AIR FLOW
E-EVAPORATIVE COOLING
VENTILATION IS TIED DIRECTLY TO:

- TEMPERATURE MANAGEMENT
- PERFORMANCE-GAIN/GROWTH/RANKING/PAY
- LITTER CONDITIONS
- CONDEMNATIONS
- DISEASE
- FUEL CONSUMPTION
THREE KEY CONCEPTS

E-Maintain Consistent temperature profile
E-Understand and use bird heat
E-Understand how temperature affects growing and gaining
E-IT IS IMPOSSIBLE TO MAXIMIZE IF YOU DON’T DO THESE THREE THINGS
Desired Temperature Profile

Figure 1. “Comfort zone” temperatures for optimum performance of growing birds
Example Optimum Target Temperatures for Best Broiler Performance

Example only: Exact optimum temp curve varies depending on feed, breed and sex.
Poor Performance House
Negative Pressure Power Ventilated House
Low Brooding Temps (90 Vs 80)

- 10 day weights 20% low
- 10 day feed conversion --worse by 30 points
WINTERTIME VENTILATION IS ABOUT MOISTURE MANAGEMENT

- HOW IT WORKS
- HOW MUCH DO WE NEED
- WHAT HAPPENS WHEN WE DON’T DO IT RIGHT
- IT’S ABOUT MOISTURE REMOVAL
- IT’S ABOUT AIR MIXING
WINTERTIME VENTILATION

- IT IS ABOUT MOISTURE REMOVAL
- HOW MUCH WATER
- WHERE DOES IT GO
Condensation Due to No Insulation
Condensation Due to Inadequate Moisture Pick Up
Condensation Due to Inadequate Ventilation or Heat
MAJOR CRITERIA IN WINTER--MOISTURE AND HEAT

SWEATING AND CONDENSATION ARE SIGNS OF IMPROPER CONTROL OF MOISTURE AND HEAT
So Goes the Litter
5 BTU/LB/HR
Birds Generate Heat and Moisture

20,000 4-pound birds = 2-3 heaters (360,000-480,000 BTUs per hour) + 1,000 gallons of water per day
Birds Also Shed Heat by Breathing or Panting
Ventilation

Ventilation, Ventilation, Ventilation

• A broiler chick excretes about 2ml of water per hour in the first week and 3.5ml per hour the second week
  – 20,000 2 week chicks = 70 liters/hour
MUST CONTROL INCOMING AIR
HOUSE TIGHTNESS

House must be tight to properly power ventilate

Try to achieve a static pressure of .15 inches (3.8 mm) with everything closed with two 10,000 cfm fans or equivalent
HOUSE TIGHTNESS

A house that will pull .20 inches (3.8 mm) has less than 10 square feet (3 m) of leakage.

On the other hand, a house that only pulls .02 inches (.39 mm) has 45 square feet (14 m) of leakage.
WIND-CHILL EFFECTS FOR 4-WEEK AND 7-WEEK BIRDS

Outside air temperature $= 90{\degree} T$

Temperature felt by 7-week birds

Temperature felt by 4-week birds

Air Velocity (ft/min)

50 100 150 200 250 300 350 400 450 500
VENTBOX VENTILATION SETUP

Diagram showing ventilation setup with:
- Sidewall air inlets
- Tunnel air inlets
- Brooding area
- Sidewall exhaust fans
- Tunnel fans
Inlets Control Mixing

Negative pressure ventilation using adjustable inlets
Inlet management controls:

- Air mixing
- Temperature
- Moisture removal
- Fuel usage
MINIMUM VENTILATION

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- Allows air to come into house with enough volume and speed to mix with warm in-house air above the flock.
- Incoming air doesn’t drop directly onto chicks.
  - No chilling.
Transitional Ventilation

4-Mid-range birds/mild or changing weather
4-Need to dispose of heat
4-Want precise temperature control
4-Don’t desire cold air to birds

4-Tunnel fans/S.P. Controlled sidewall inlets
VENTBOX VENTILATION SETUP
TRANSITIONAL VENTILATION

Transitional ventilation really starts when we start exhausting unwanted heat from the house.

Transitional ventilation ends when we must have wind chill cooling to keep birds comfortable.
Rule of Thumb

Stay in transitional as long as it is possible to maintain close to optimum temperatures
Key Point

**E**-Running four tunnel fans and bringing air through the sidewall vents will give same air exchange rate as four fan tunnel---

**E**-BUT WILL IT GIVE THE SAME BIRD HEAT REMOVAL RATE????
The effect of Recirculation Fans in a Tight House
HOT WEATHER TRENDS

3 TYPES OF SCENARIOS

E - BIG BIRD HOUSE
E - SMALLER BIRD HOUSE
E - DOING AS GOOD AS WE CAN WITH GOOD CONVENTIONAL HOUSING
E - IT IS ALL ABOUT HEAT REMOVAL
E - TUNNEL IS FOR COOLING HOT BIRDS
Modern Dark Curtain Tunnel

Houses in US

4-1/2 pound improvements in big birds
4-1/10 pound improvements in smaller birds
4-15 points better FC big birds
4-5 points better FC small birds
4-Better Livability
Effective Temp = Thermometer Temp - Wind Chill
4-WIND CHILL ON HOT BIRDS

4-YOUNG BIRDS—2.5 DEGREES/FAN
4-FOUR WEEK AGE—1.5 DEGREES/FAN
4-BIG BIRDS—1 DEGREE/FAN

4-GREATER WITH COLD AIR
4-LESS WITH HOT AIR
4-GREATLY REDUCED ABOVE 90 Degrees
Monitor and maintain adequate airflow

- Keep tunnel inlets fully open
- Partly closing tunnel inlets does not increase air velocity, it reduces needed airflow
- Keep fans and shutters clean and belts tight
- Close all doors and seal all leaks or other openings, so all incoming air enters through tunnel inlets only
TUNNEL COOLING
KEEP EQUIPMENT IN WORKING ORDER
Cool Cell Management

Never operate pads below 80 degrees (26.5°C)
Do not operate pads when humidity is above 80%
Never operate pads until all fans are running on older birds
PAD MANAGEMENT

Keep pads as clean as possible

- Dirty pads restrict air flow thus reduces air speed

Use algaeicides regularly to prevent algae buildup

Watch for mineral buildup
Hen House Ventilation at feeding time

Temperatures were measured over several days and averaged.

Temperatures were measured in two places.

• 15” over the feeder at nearest the outside wall
• 36” above the litter in the center of the house.
Hen House Ventilation at feeding time

The difference in temperature between the outside wall and the litter area is especially significant during feeding time.

If adequate fans are not operating, hens will get TOO hot, leading to feed refusal, and higher mortality.
House #1 Ventilation

- Feeder Line
- Scratch Area
Temperature Difference

#1
#2
Air speed in a 500’ long by 40’ wide breeder house.

The house had 48 slant wall fans.

Air speed was measured in 4 positions

- at feeder height next to the outside wall.
- at feeder height next to the mechanical nest.
- at 12” above the litter in the center of the house
- at 60” above the litter in the center of the house.
Hen House Ventilation at feeding time

The next slide shows the difference in air flow rates in different places and with different numbers of fans.

The lesson is that during feeding time, if the outside temperature is above about 65 degrees F., all fans should be operating.
Air Flow Rate
by location and number of fans

- Slats Outer
- Slats Inner
- Scratch 12"
- Scratch 60"
WHAT I SEE THAT AFFECTS BIRD ENVIRONMENT

HOUSE WITH INLETS MISMANAGED
INLETS THAT DON’T SEAL SHUT
INLETS WITH NO SHUT OFFS
INLETS AT TOTAL DIFFERENT OPENINGS — CABLE STRETCH
LITTLE OR NO EFFORT TO SEAL TUNNEL INLET — OR TUNNEL FANS
LACK OF UNDERSTANDING OF MINIMUM VENT TIMERS