Webinar Co-coordinator
Holli.Kuykendall@gnb.usda.gov

Presented in partnership

USDA NRCS National Energy Team
and East National Technology Support Center

2014 Energy Conservation Opportunities Webinar Series

Webinar Co-coordinator
"Kip" Kenneth.Pheil@por.usda.gov

Date	Webinar Topics
Mar 20	Key NRCS Practices: Farmstead Energy, Lighting, and Building Envelope
May 22	Lighting Systems: Analysis, Performance, and Energy Conservation Opportunities
Aug 28	Energy Analysis: The Newly Revised NRCS Agricultural Energy Management Plan
Sep 18	Energy Upgrades: Steps to Implement Energy Conservation Opportunities (Postponed)
Nov 20	**Poultry Operations: Broiler and Layer Energy Conservation Opportunities**

On-demand replays are available within one week of the live webinar.

CEUs and Certificates

Return to the webinar portal and complete Step 2 when the presentation has concluded

Take a brief post-test

Enter your certification credentials, including your certification number, if appropriate

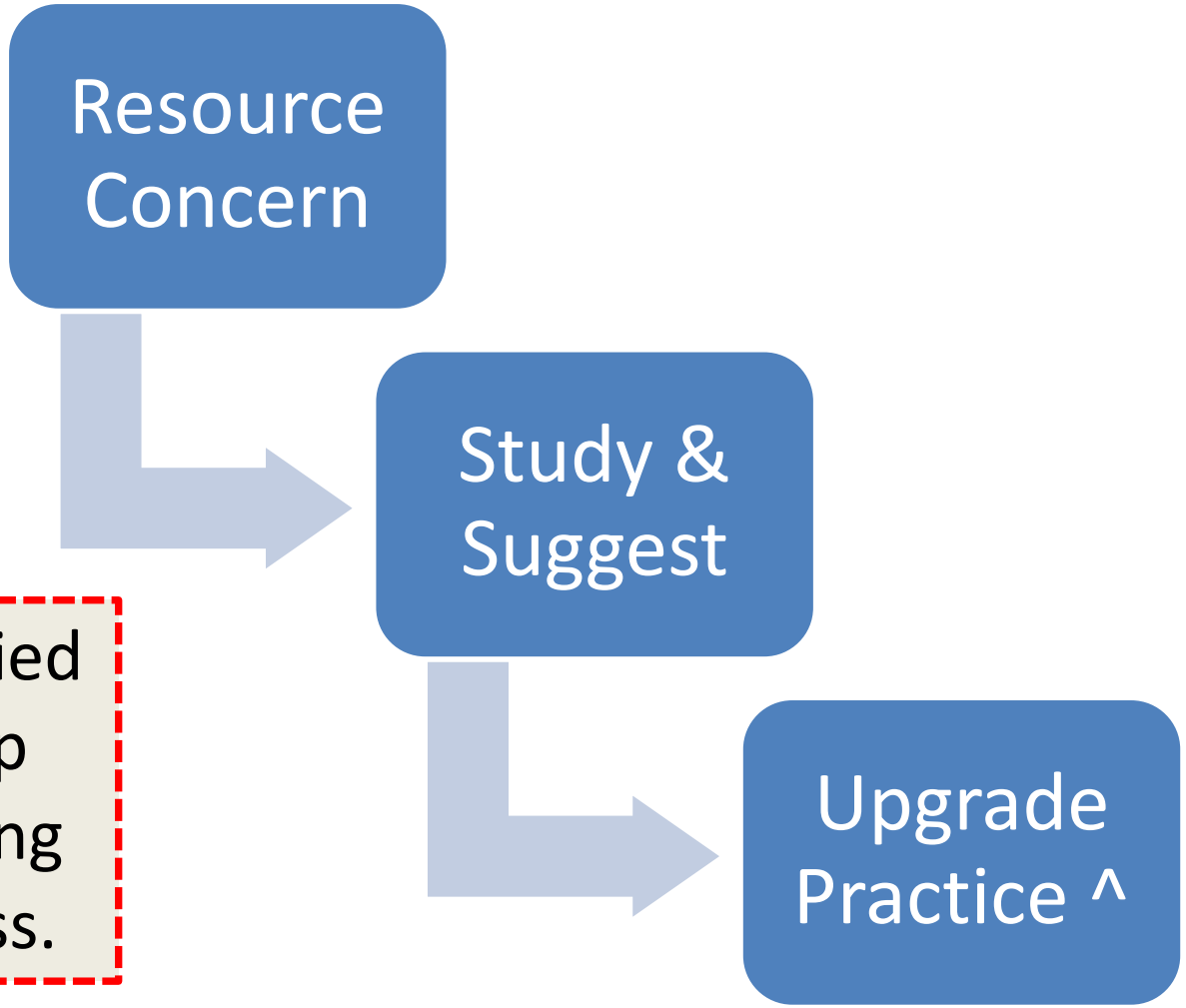
Receive by email your training certificate

The ENTSC submits Professional CEUs the first of the month on your behalf (CCA, SAF, AFGC, ARPAS, TWS, ARPAS, and/or SRM), but not for Conservation Planner or other state-specific certification programs

Join information for our webinars is made available at the Science and Technology Training Library at ConservationWebinars.net. The webinar portal at ConservationWebinars.net is provided in partnership with Southern Regional Extension Forestry.

SREF

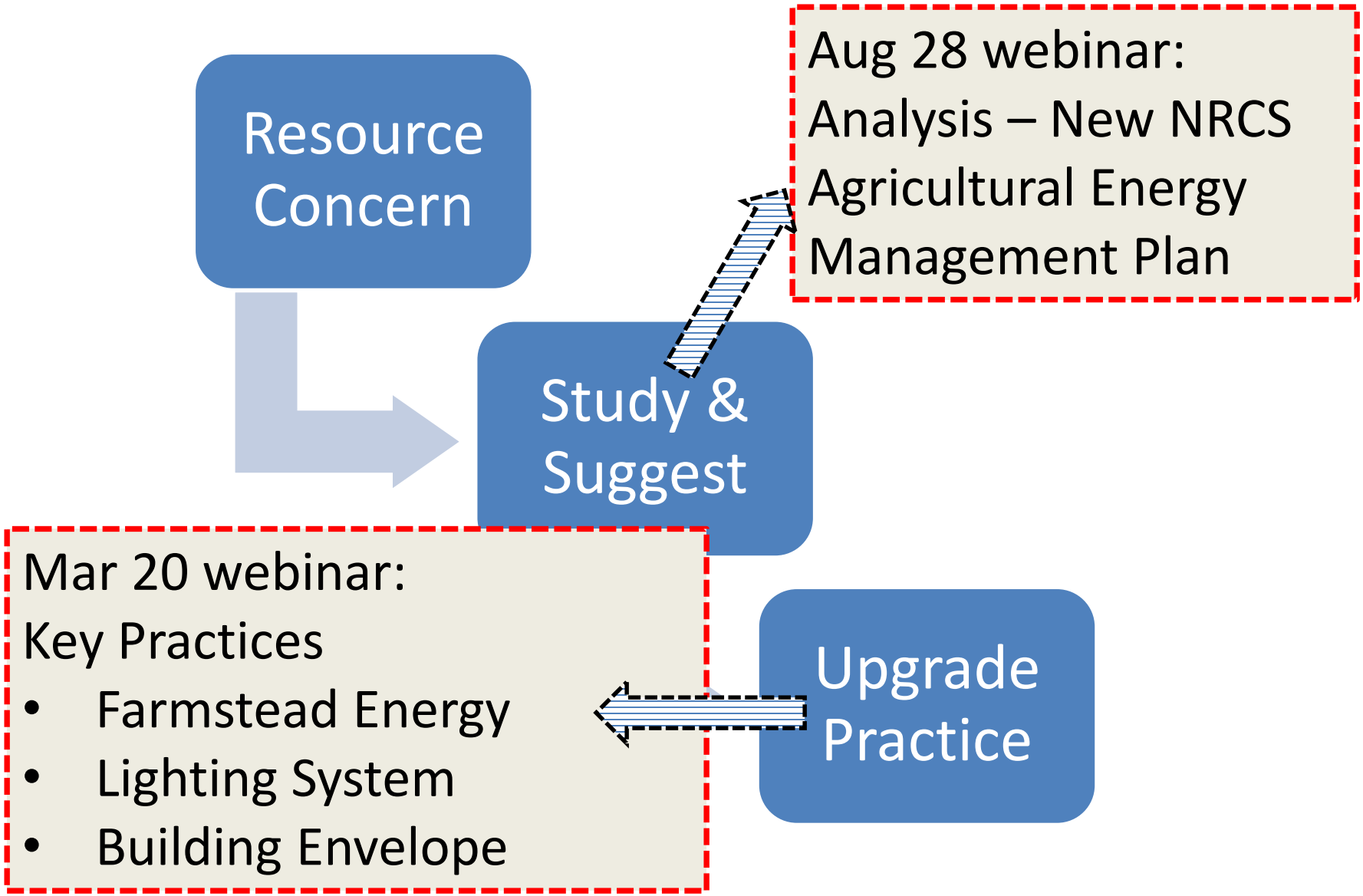
Upgrade Path – SWAPA+(H)E



Simplified 9-step Planning Process.

^ aka Conservation Practice Standard (CPS)

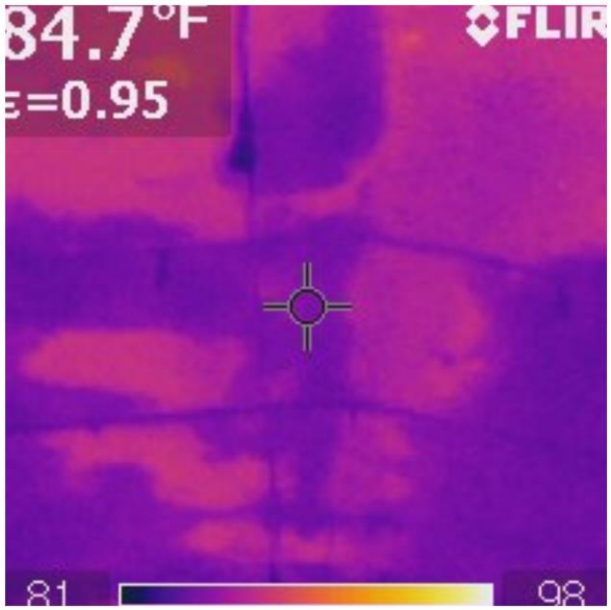
Upgrade Path – Energy



Poultry House Energy Concerns

NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

Dennis Brothers – NPTC Poultry Housing Specialist
NRCS Webinar - 2014



NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

The Bottom Line:

- The Five most effective energy opportunities for broiler/pullet/breeder houses are (in order of impact):
  1. Energy Efficient Lighting
  2. Curtain to solid/insulated sidewall conversion
  3. Improved attic insulation
  4. Reducing in-house temperature stratification
  5. Conventional to Radiant heating conversion

Broiler, Breeder & Pullet House Lighting

NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

Bulb Types

Incandescent (Edison Tungsten Filament) High Pressure Sodium Vapor (HPS)	Energy Hogs
Cold Cathode (CC Or CCFL) Dim Compact Fluorescent (Dim-CFL)	More Energy Efficient
Non-Dim Compact Fluorescent (CFL) Dim/Non-Dim Light Emitting Diode (LED)	Most Energy Efficient

Different Lighting Needs For Different Birds & Houses

Concerns: Initial, Replacement, Operating Costs & Warranty

Need To Give Good Advise To Growers On Lighting Changes

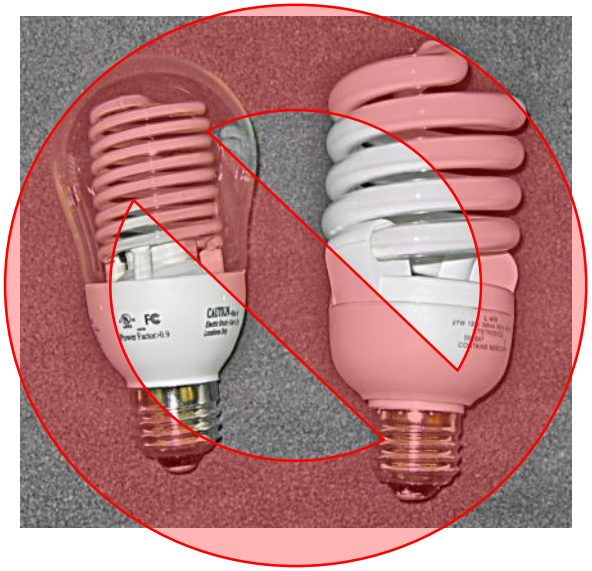
***** Heat Is Biggest Enemy Of All Lights! *****

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

LED Lighting Projects

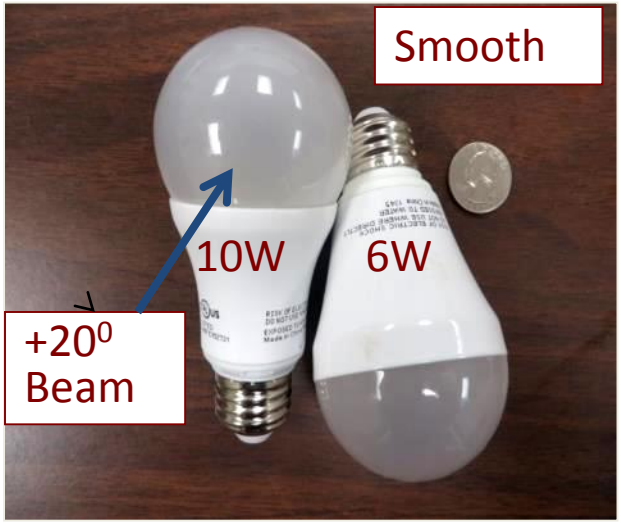
NPTC Is Monitoring:

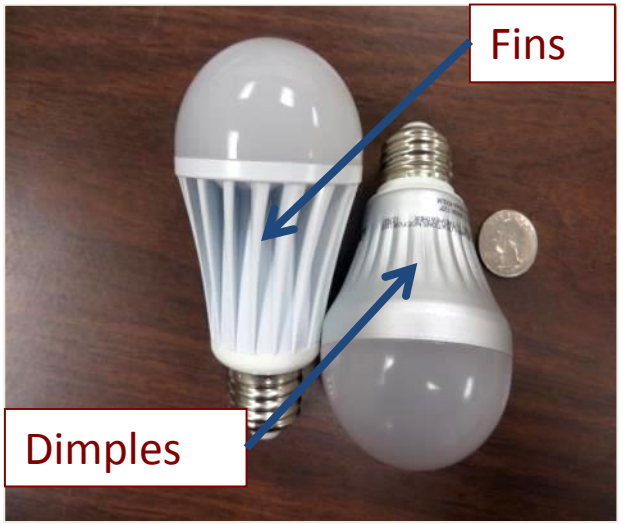
- **More Than 25 LED Brands, Models, & ^{0}K**
- **Over 40 Broiler, 20 Breeder Hen Houses + Pullets**
- **GP & GGP Houses**
- **New Houses & Retrofits**



Bottom Line: LED's=Most Efficient Upgrade Available!

Bulb Shapes





A19 LEDs – Classic "Thomas Edison" Shaped

CFL

CC

PAR XX LEDs (XX/8" Wide)

Heat Problems With Some Fins & Dimples

Hybrid LEDs

HPS

Poultry Engineering, Economics & Management

Newsletter of the

National Poultry Technology Center, Auburn University

Critical Information for Improved Bird Performance Through Better House and Ventilation System Design, Operation and Management

Produced in cooperation with the U.S. Poultry & Egg and Alabama Poultry & Egg Associations

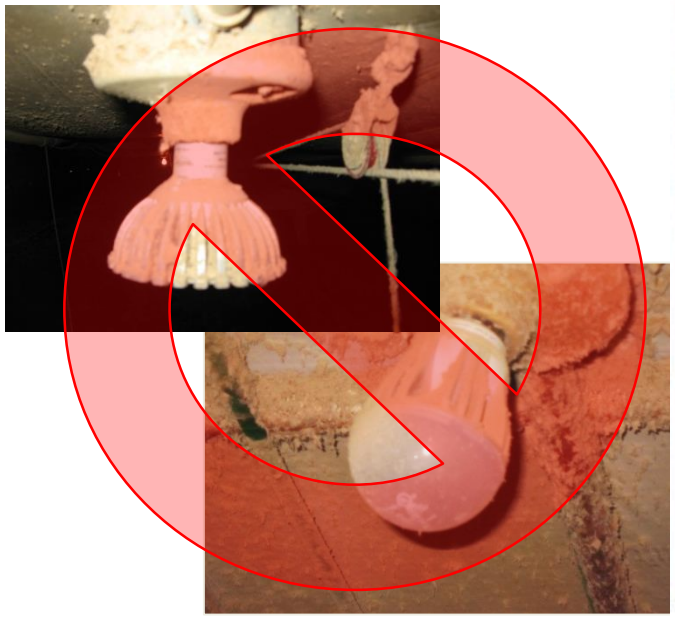
Issue No 81, March 2014

Update: LEDs for Broiler House Lighting

National Poultry Technology Center – Auburn University College of Agriculture

By: Gene Simpson, Dennis Brothers, Jess Campbell, and Jim Donald

- **Uniformity**
- **Performance?**
- **Longevity**
- **Cost / Payback**
- **Warranty**
- **Light Meter****



High Ceiling Lighting Problems

Very Different Considerations

- Intensity Too Low
- Bulbs 11’-15’ High
- Too Few Sockets
- Baffles Blocking Light

Likely Will Need:

- New Wiring Circuits
- More Sockets
- Reflectors/PAR Bulbs
- Higher Wattage/Lm Bulbs
- Lower Height Bulbs

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

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

50 Bulbs @ 4,500 Hours Per Year

Bulb Type	Number	Watts Per Hr	Power Rate	Annual Cost*	Annual Savings	Repl. Cost	Years Life
100W Inc	50	5,000	.12	$2,700	----	$25	0.25
75W Inc	50	3,750	.12	$2,025	$675	$25	0.25
60W Inc	50	3,000	.12	$1,620	$1,080	$25	0.5
8W CC	50	400	.12	$216	$2,484	$400	2
6W LED	50	300	.12	$162	$2,538	$600	5-7

~Annual Power Cost & Savings Estimates For 40' X 400' Hen House Lights

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

Assuming 5,000 Hours Per Hen Flock

Light Type	Approx Number	kWH Used	Power Rate	Annual Cost*	Annual Savings	Repl. Cost	Flocks
150W HPS	32	.1875	.12	$3,600	-----	-----	---
23W CFL	100	.0230	.12	$1,380	$2,220	$300	2
10.5W LED	100	.0105	.12	$630	$2,970	$1,000	5-7

** Excludes Any Demand Metering Charges **

Problems & Considerations

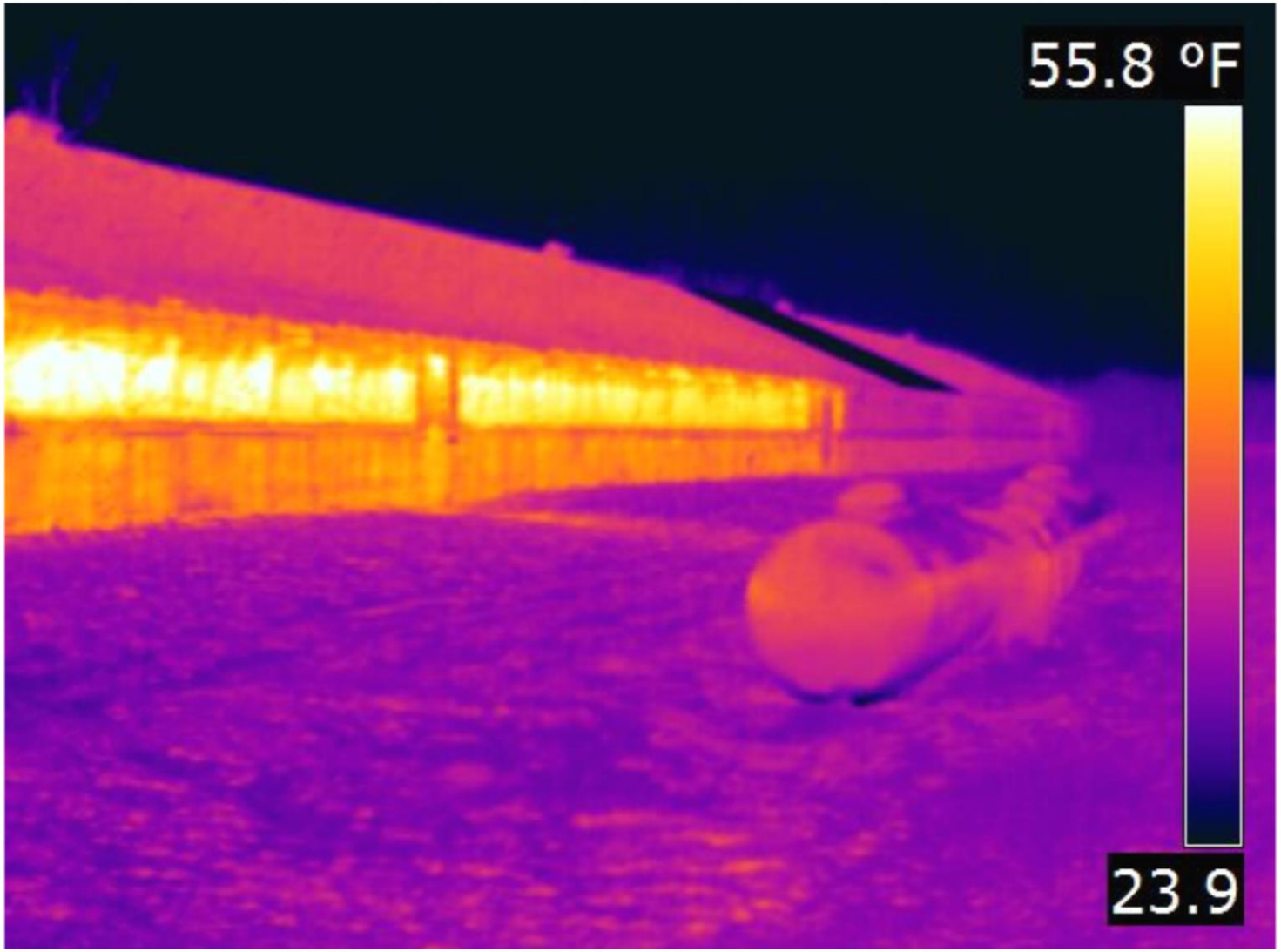
- **Electrical Issues – Invest In Checkup (NEC)!**
- **Corroded/Decaying Sockets – Ni Plated Brass**
- **Monitor Equipment Placement**
- **Old Analog / Triac Dimmers vs. New LED specific choices**
- **Performance Equivalence!**
- **Payback On Energy efficient Lighting (LED):**
  - **Broilers – 2-4 Flocks**
  - **Breeder Hens – <1 Year**
  - **Pullets – 1 Year**

NPTC National Poultry Technology Center AUBURN UNIVERSITY

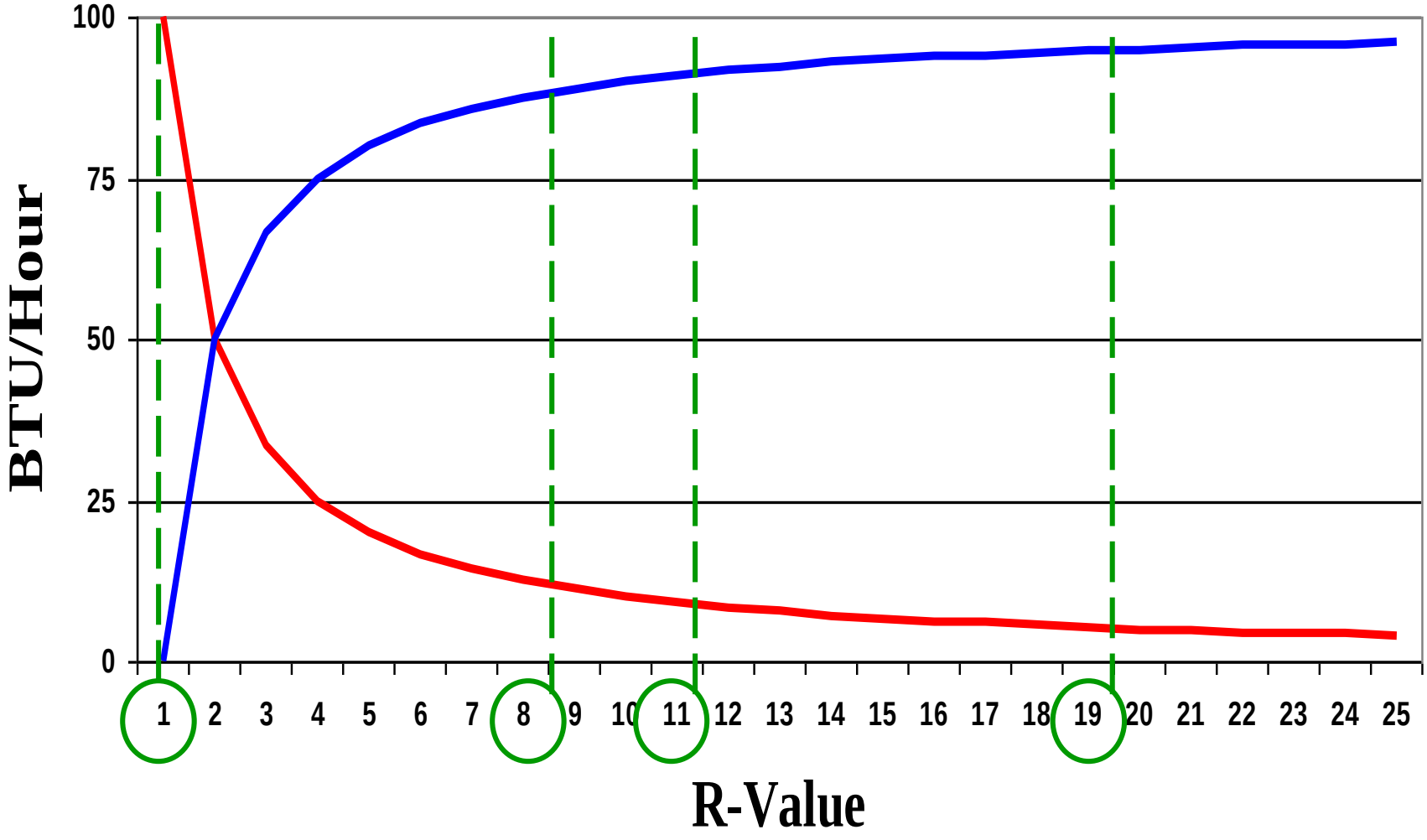
The Bottom Line:

- LED lighting has proven to work and has pay-back of less than a year from cost savings.
  1. A-19 type LED's are least expensive and proven most reliable and versatile.
  2. Dimmer changes to LED specific are recommended.
  3. Non-dim CFL bulbs are useful as "brood bulbs"
  4. cold-cathode bulbs, high pressure sodium, dimmable CFL, incandescent are out.

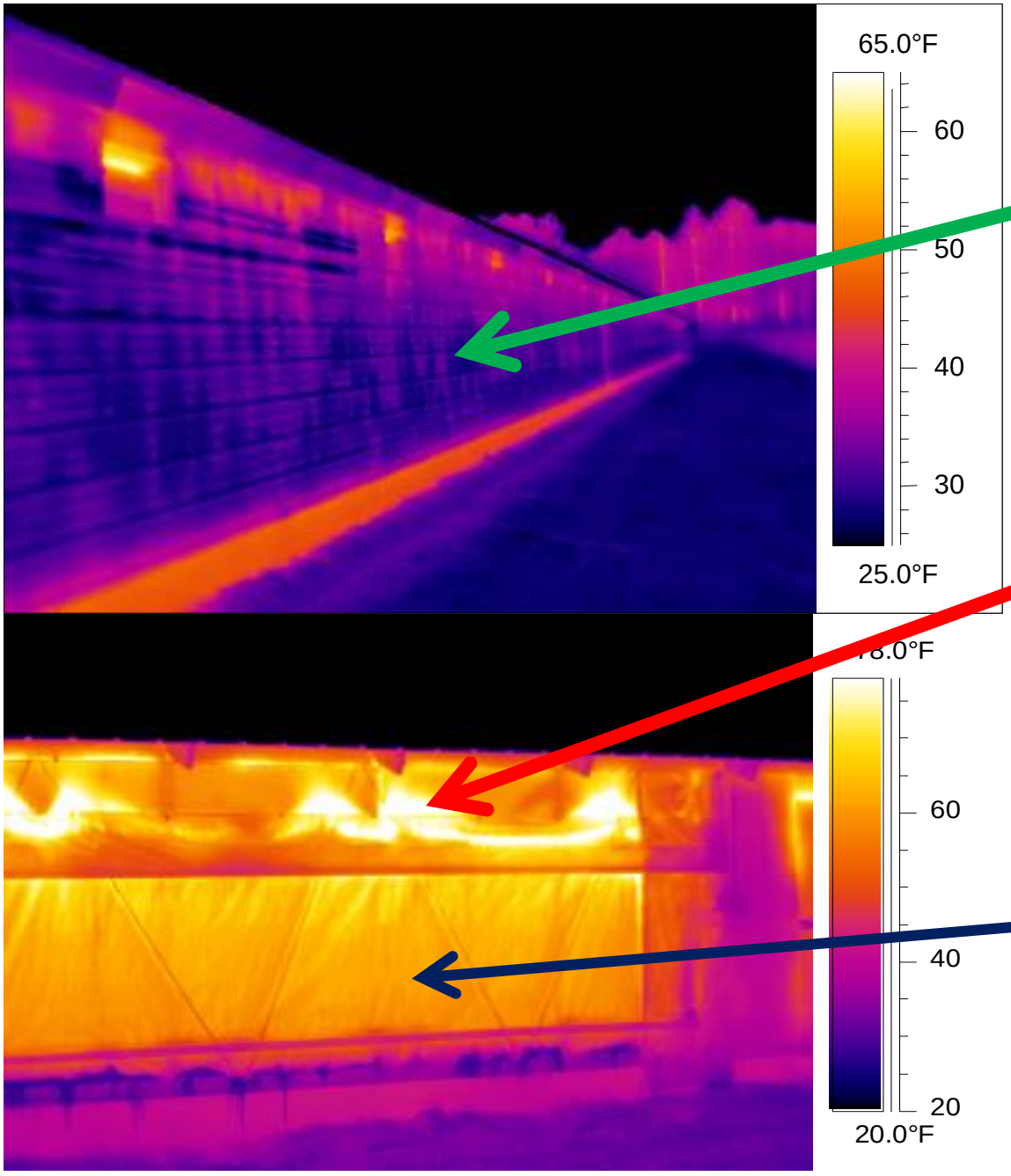
Structural Opportunities



Surface Area Heat Loss



NPTC
National Poultry
Technology Center



- 5 btu's / hour lost per square foot of insulated sidewall
- 5,000 btu's / hour lost per square foot of cracks
- 50 btu's / hour lost per square foot of curtain

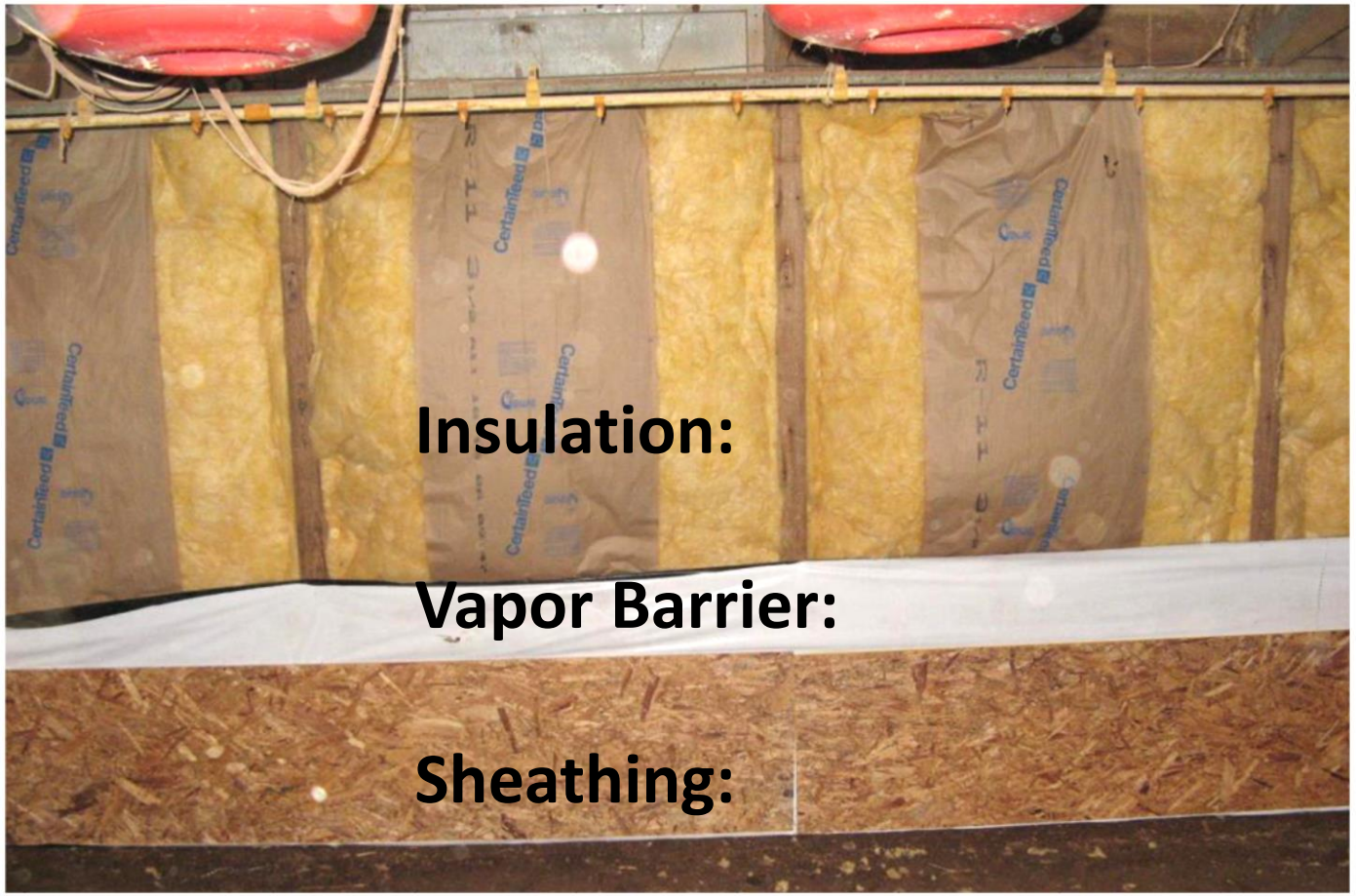
NPTC National Poultry Technology Center
AUBURN UNIVERSITY

Fiberglass Batt – Curtain Retrofit

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

Curtain Sided ->Solid Wall Exterior Retro-fit Options

Retro-fit Interior Wall design



NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

Spray Foam and Side Wall Curtains

NPTC National Poultry Technology Center

Dennis Brothers, Gene Simpson

Types of Foam

- Base – 3#/CF Closed Cell Polyurethane
- Bottom area – 6-10#/CF CCP
- OR cover with lumber protection

NPTC
National Poultry Technology Center

NPTC
National Poultry
Technology Center

“Scrape Boards” – wall protection

NPTC
National Poultry
Technology Center

Several Options

Full sidewall application

Curtain window only application

NPTC
National Poultry
Technology Center

“Unconventional Side Walls”

NPTC
National Poultry
Technology Center

Sidewall Curtains

NPTC
National Poultry
Technology Center

Curtain Condition

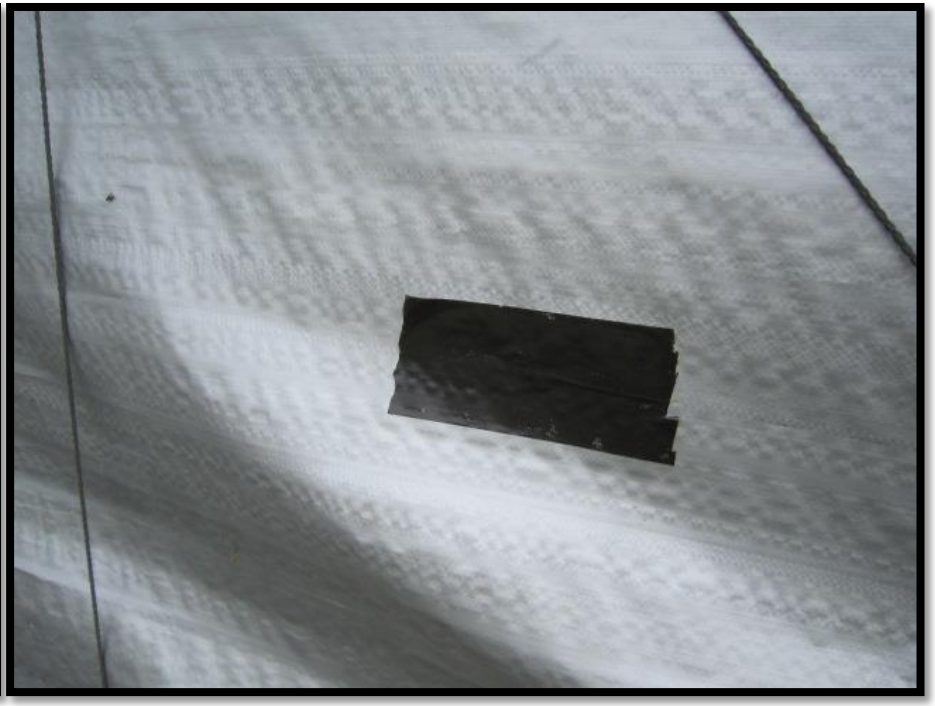
- Typically – sidewall curtains last 7-10 years
- Wind, sun, raising and lowering - detriments
- Convert them to static coverings – doubles the usable lifetime

Condition Varies

- **Age**
- **Maintenance**

NPTC
National Poultry
Technology Center

Repairs are acceptable



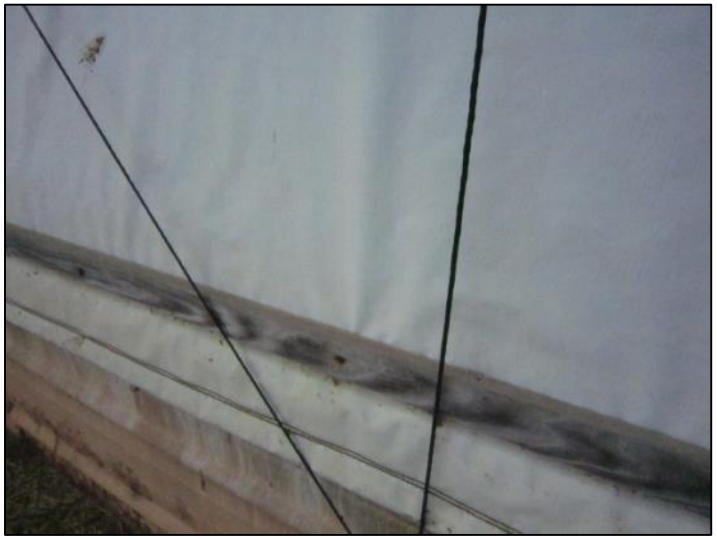
- Commercial “Curtain/Ceiling tape”
- Good ole’ “Duck Tape”

NPTC
National Poultry
Technology Center

Beyond Repair

NPTC
National Poultry
Technology Center

Many ways to secure before foaming:



NPTC
National Poultry
Technology Center

Metal is ALWAYS an Option

NPTC
National Poultry
Technology Center

Bubble Foil Wrap

"Better than nothing" - But not much better.

NPTC
National Poultry
Technology Center

The Bottom Line:

- Sidewall curtains loose energy at alarming rates.
  1. Leakage is the primary culprit – always attack this first and hardest.
  2. Surface heat loss is second.
  3. Spray foam application is most effective and cost-effective way to combat both.
  4. Fiberglass batt installation yields only slightly more R value, but seals less, may last longer.

Attic Inspection

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

What to Look For

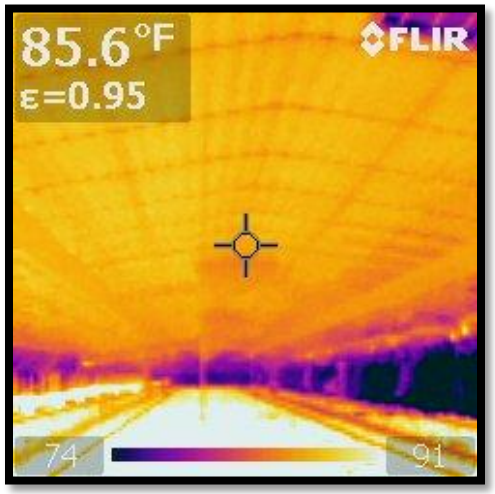
NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

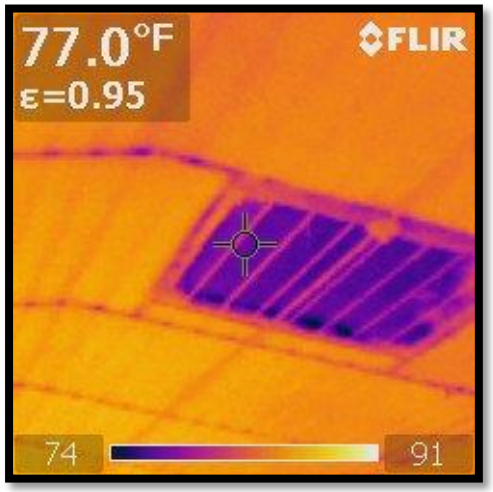
NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

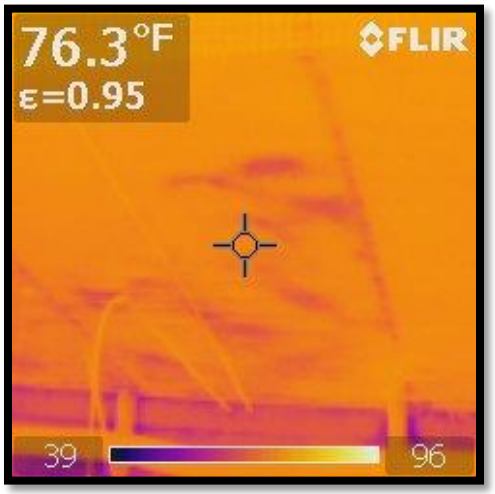
Fiberglass Batts = still the best option.

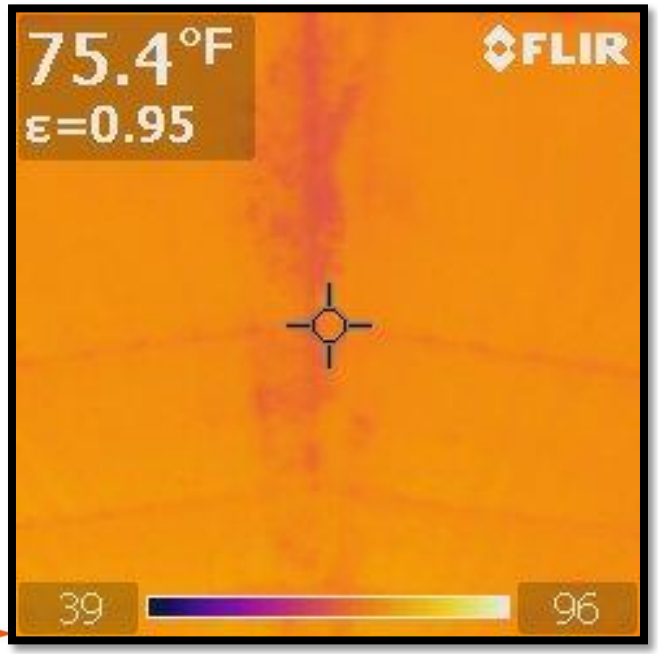
NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

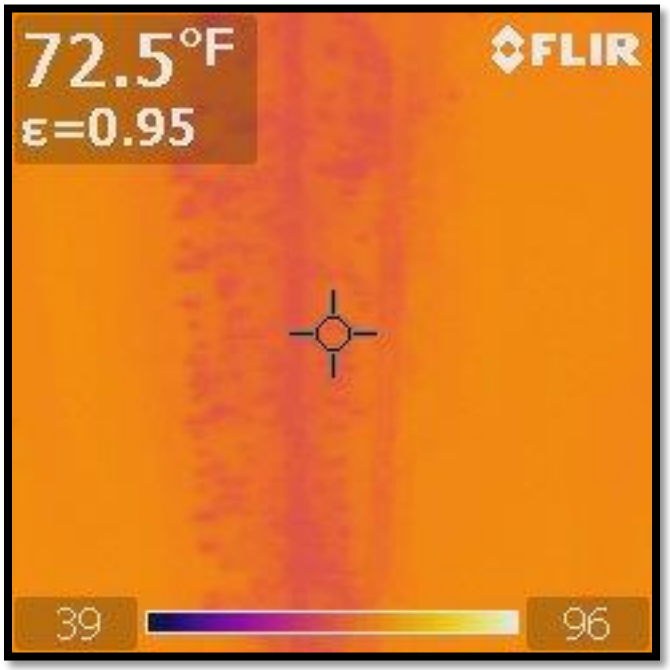
Thermal Imaging





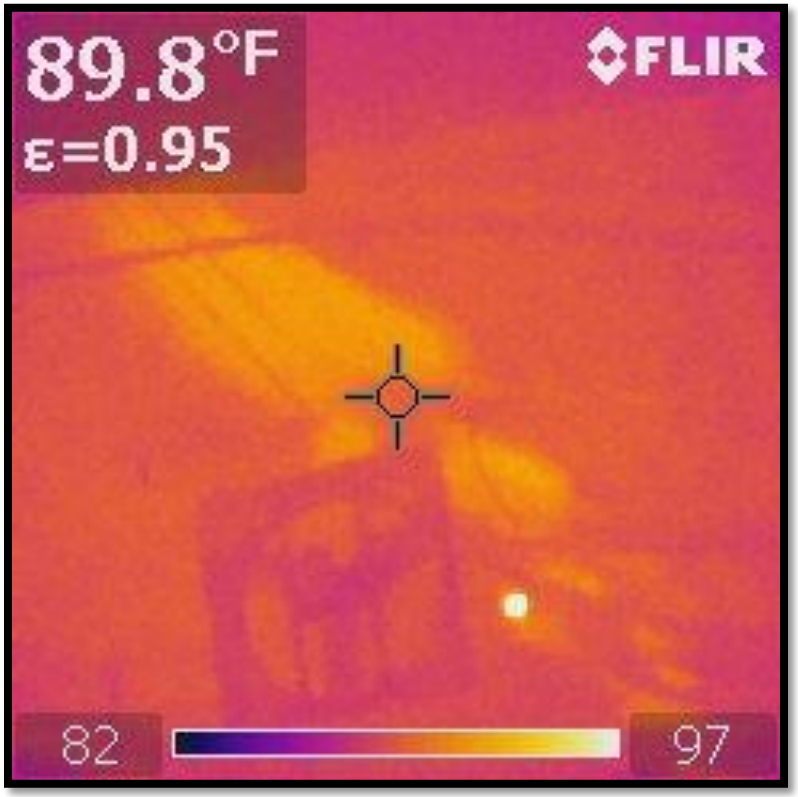


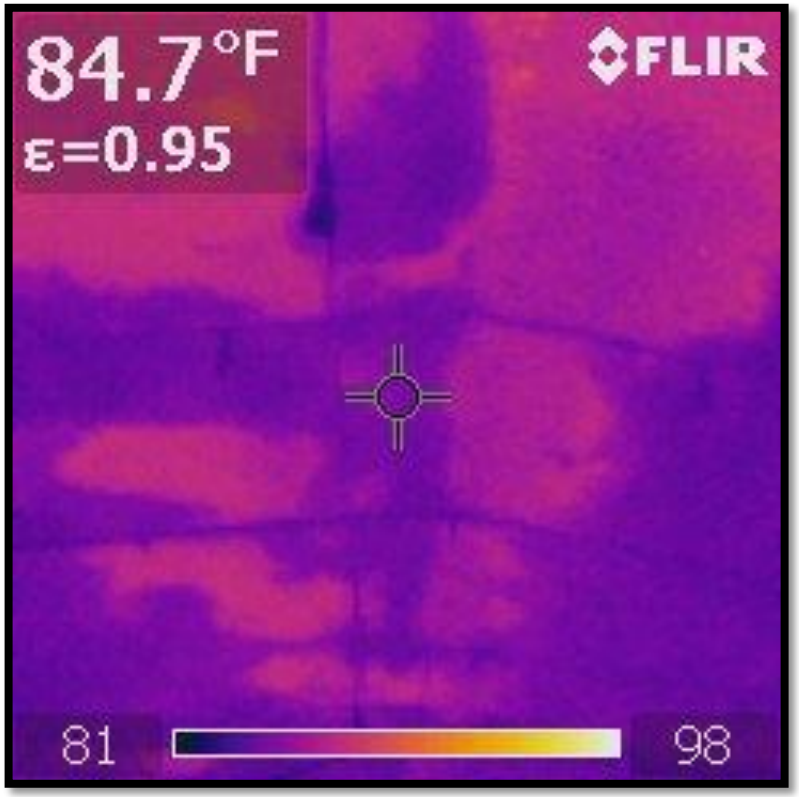




NPTC
National Poultry Technology Center
AUBURN UNIVERSITY

“Reverse” Thermal Imaging



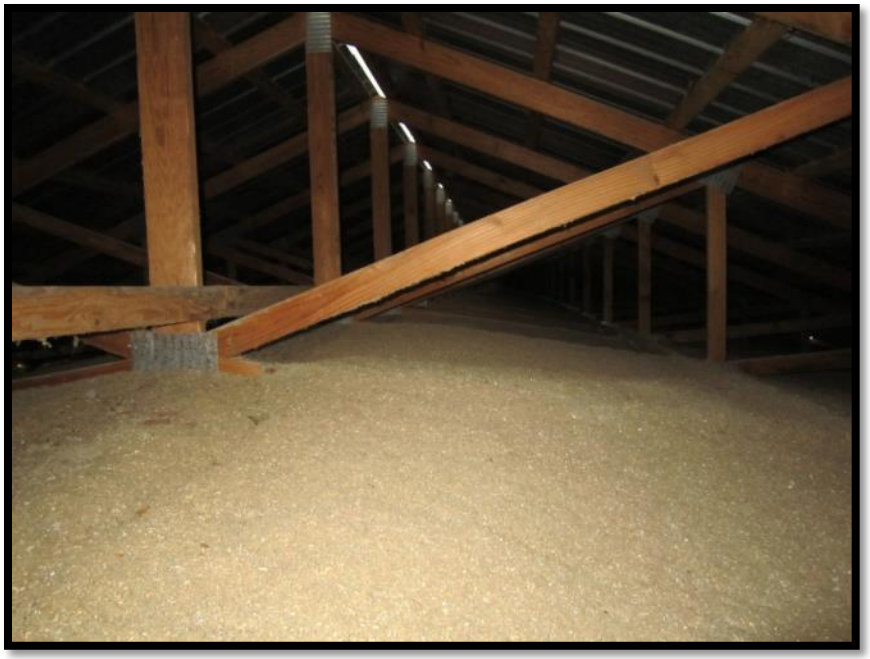


NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

R-13 Fiberglass Batts

Smaller benefit to improving this situation.



NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

The Bottom Line:

- Blown cellulose attic insulation will be problematic over time.
  1. All blown cellulose will settle and on pitched ceilings, it will eventually slide down the slope.
  2. Fiberglass batt attic insulation is best long term choice, it is more expensive at installation.
  3. Blown fiberglass insulation is acceptable substitute for batt.
  4. BFG is only feasible/economical solution to improve separated BC.

Circulation Fan Systems

Baskets

Paddle

Orientation

Temperature Stratification

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

Benefits of Using Stir Fans

Type	Fuel Savings	Payback in Fuel
Old House	15 – 25%	1-2 years
New House	5 – 10%	3-4 years

Grower:

1. Saves Fuel Energy
2. Improves Environmental Control
3. Better Moisture Removal
4. Improved Litter Quality
5. Healthier Better Performing Bird

Company:

1. What Benefits Grower = Company
2. More Efficient Production

The Bottom Line:

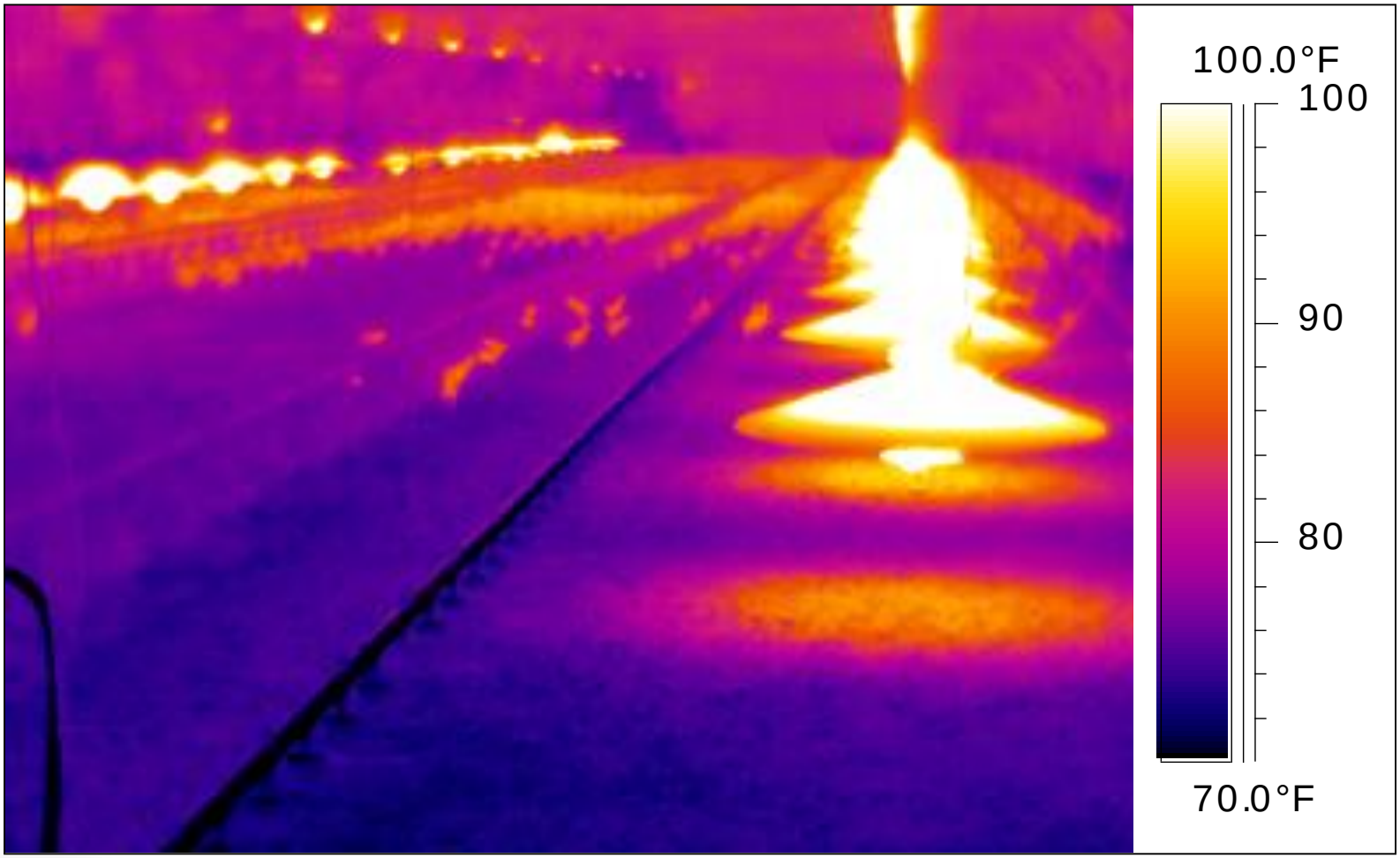
- In every poultry house where heat is being produced, temperature stratification occurs.
  1. Heat always rises to the ceiling, but we raise birds on the floor.
  2. All winter time ventilation efforts must take this stratification in consideration.
  3. Stir fan addition is a very quick and economical way to break temperature stratification.
  4. Stir fans should be open cage design and installed per mft. specifications.

Radiant Heating Appliances

Jess Campbell, Dennis Brothers, Jim Donald

NPTC
National Poultry
Technology Center

Conventional Heat?



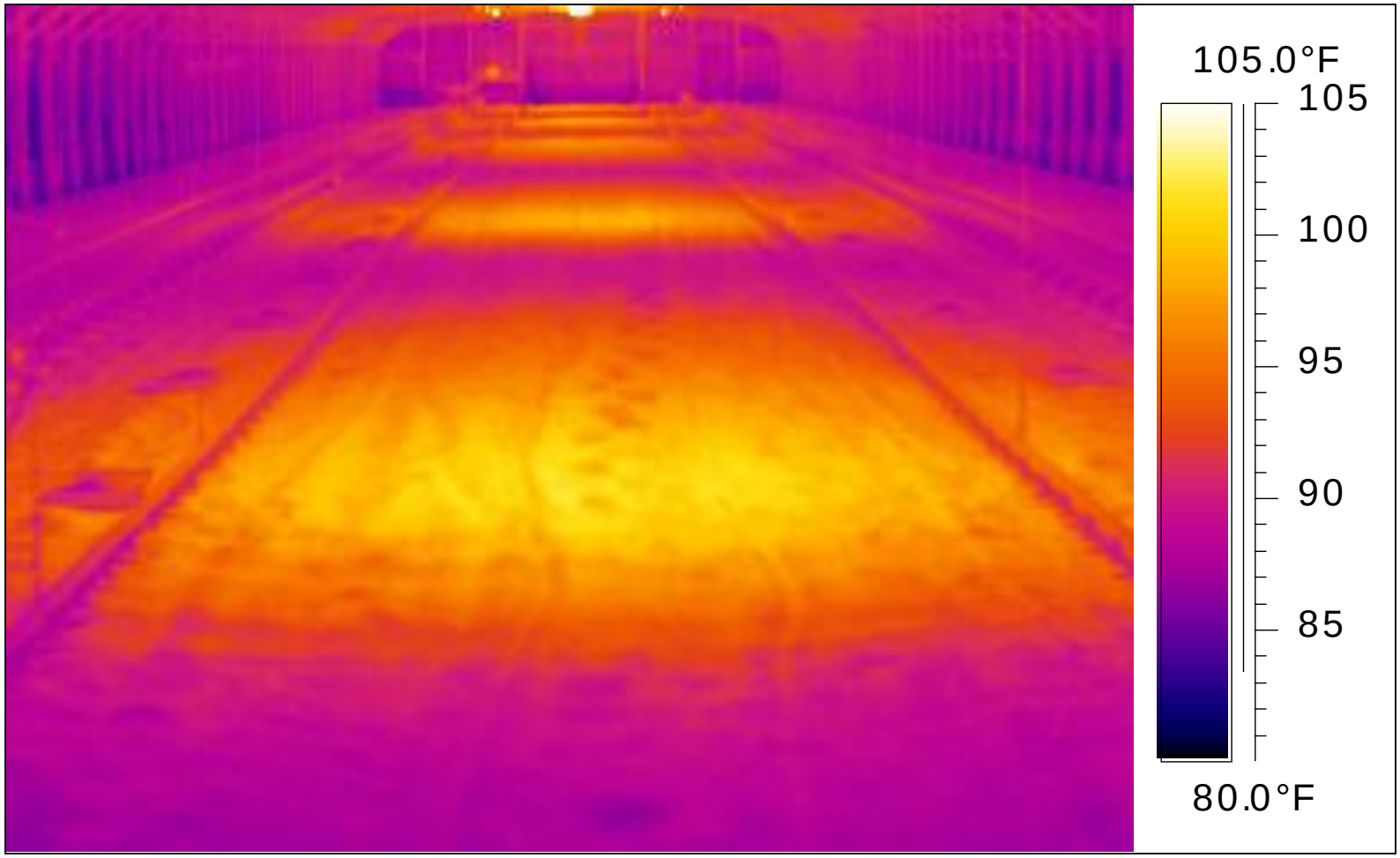
NPTC
National Poultry
Technology Center

Conventional Heating Appliances

- Pilot lit “Pancake” or “Rocket Jet” brooder
- Forced Air Furnace or “Box Heater”

NPTC
National Poultry Technology Center

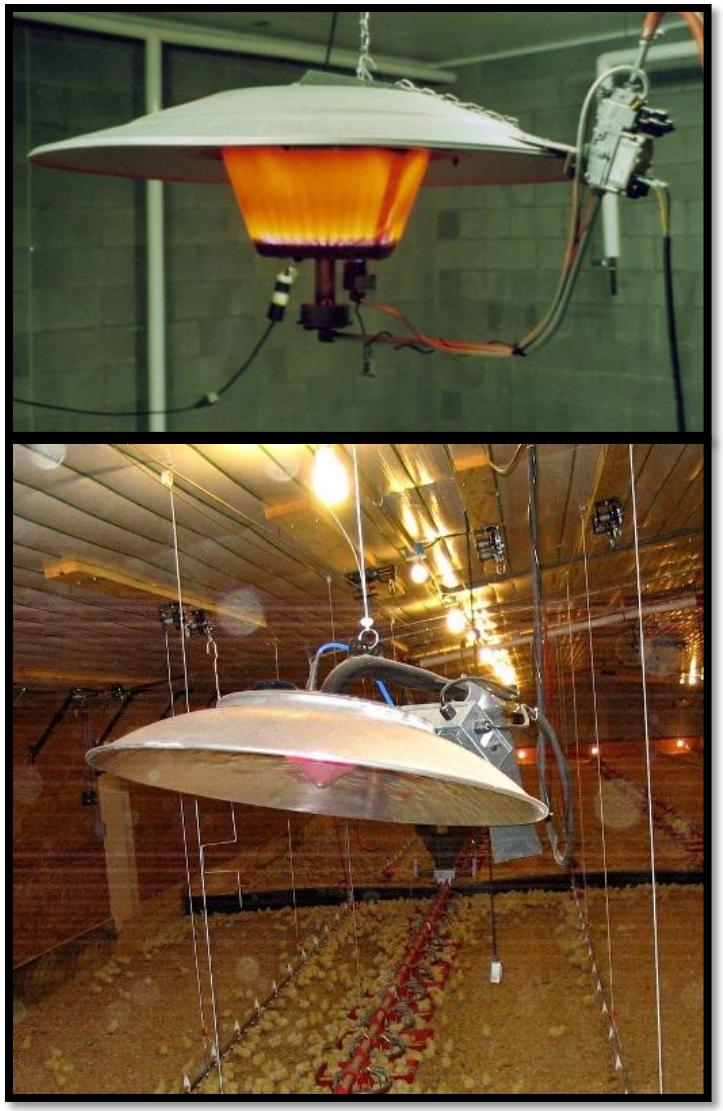
Vs. Radiant Heating



NPTC
National Poultry
Technology Center

Multiple Options

All Radiant = All Work



- "Round Radiant"
  - 40,000 – 43,000 btu / unit
  - Spark Ignition
  - LP or NG

NPTC National Poultry Technology Center

Multiple Options

All Radiant = All Work

- Long Tube
  - 40’ – 50’ long
  - 125,000+ btu / unit

- Short Tube
  - 6’ - 20’ long
  - 80,000+ btu / unit

NPTC
National Poultry
Technology Center

Multiple Options

All Radiant = All Work

- High Output “Quad Radiant”
  - 80,000 btu / unit

NPTC
National Poultry
Technology Center

Heating “Hot” Points

- Many types of Radiant Appliances
- All have similar efficiencies
- Apx. 15% better than conventional heat
- All types strengths and weaknesses
- Grower / Integrator determines choice
- Grower / Integrator / Manufacturer determines number, layout and plumbing
- All the above is driven by bird needs

The Bottom Line:

- Conventional heating appliances produce more heat that rises than is directed to the floor.
  1. Forced air furnaces are essentially top down heaters.
  2. Pancake brooders are 60/40 air heaters.
  3. Radiant brooders are 60/40 object heaters – radiating heat to the floor like light from a flashlight.
  4. Heating the floor allows for less overall heat energy needed for the birds on the floor.

Questions?

NPTC
National Poultry
Technology Center
AUBURN UNIVERSITY

www.poultryhouse.com