Energy Efficient Houses

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Why Are We Worried About Energy??
Consider……
- Regional Residential Electric Cost:
  - Athens, GA: 7 cents per kwh
  - Seaford, DE: 15 – 18 cents per kwh
- Rising Delmarva Electric Rates
  - DE Electric Co-op: 7 cents per kwh (for now)
  - Delmarva Power: 65% increase (15-18 cents per kwh)
  - Choptank Electric: 35% increase

The majority of electricity is used by:
- tunnel fans during hot weather, and,
- by lights during cold weather.

LP gas is the largest component of energy consumption during cold weather.

Where Is Most Energy Consumed?

The majority of electricity is used by:
- Tunnel fans during hot weather, and,
- By lights during cold weather.

LP gas is the largest component of energy consumption during cold weather.

Where do houses transfer heat?
- Curtains (R ~ 1.00)
- Concrete Foundation (R ~ 2, for 8")
- Air leakage (sill, doors, holes, vent boxes, etc.)
- Excessive ventilation.
- Lack of ceiling insulation.

Remember that tight, well-insulated houses conserve energy in summer heat as well as winter.
• New Poultry Housing Construction Features Support Energy Efficiency:
  – Wider housing.
  – Solid, insulated sidewalls.
  – Radiant tube heaters.
  – Low wattage light bulbs.
  – Low horsepower recirc fans.

• New Poultry House Construction: What Else Should We Include??
  – Tunnel Boards: Insulated boards covering the cooling pad.

• New Poultry House Construction: What Else Should We Include??
  – Choose tunnel fans with a high VER (ventilation efficiency ratio) that provide a high air flow rate per watt of input.

• New Poultry House Construction: What Else Should We Include??
  – Use end doors that really seal tight.

• New Poultry House Construction: What Else Should We Include??
  – Additional thermal insulation in ceiling if energy prices increase.
  – Take precaution against ceiling insulation “moving” in attic from wind; use batts instead of loose fill product.

• New Poultry House Construction: What Else Should We Include??
  – Use recirc pad systems instead of spray on pad systems to reduce the wall surface exposed by pads.
• Recently constructed wider housing uses less energy than earlier construction.

• Newer housing typically has less curtain and more insulation in sidewalls and ceiling.

• Component shrinkage and settling occurs over the years to reduce house tightness.

• Let’s Compare Energy Use by Houses on 3 Farms to See the Value of New Housing and Thermal Insulation. (all flocks 49-52 days)

  1. Older Houses (3) • ’70s style, 40 x 400, curtain sided, tunnel, radiant brooders, recirc pads, ceiling insulation matted to 2 – 2.5”

  2. Mid Level Houses (2) • ~ 6-7 years old, 46 ft. wide, north wall solid – south curtain, tunnel, radiant brooders, recirc pads, ceiling insulation 5.5-6”

  3. New Wide Houses (3) • online Jan 2005, 60x 500, solid sidewall, tunnel, radiant tubes, recirc pads, ceiling insulation ~6”

• LP Gas Use (gals/1000)

• Electric Use (kwh/1000)

• Improve the older house?
  – Growers typically don’t want to invest (much) in older houses that are already or almost paid off.

• Are there simple upgrades that aren’t terribly expensive?
  – Sealing the sill.
  – Reworking the end doors.
  – Restoring ceiling insulation.
  – Basic house maintenance.

• Fall, 2004
  – Used foam weather stripping and spray foam to seal the sill plate/foundation crack.
  – Improved seal on end doors.
  – Covered pad opening with polyethylene.
  – Spent about $250 in materials to tighten the house.
  – Raised tightness test static pressure from 0.05” to 0.11”.
Sealing the Sill/Foundation Crack

Using Spray Foam to Seal the Sill

Sealing the End Door

Tightening Older Houses: Project Houses

• Fall, 2005
  – Used two small tanks of spray foam ($335/tank) to seal the sill plate/foundation crack for both total lengths of sidewall (1000 ft.).
  – Foam was same “expandable” product as in the small cans.
  – Several other leakage problems, but sill was the worst.
  – Began with tightness test static pressure between 0.03” and 0.05”.

Sill/Foundation Needs Sealing

Filling Void With Expandable Foam
• Even if all your tunnel fans are the same “exact” model…. They don’t all perform the same, especially over time.
  – Using a FANS unit (in place fan air flow testing device), the flow rate of a fan can be measured with 1% accuracy. The voltage and current drawn by the fan motor can also be easily measured.
  – Staging the most efficient tunnel fans first saved 3-5% on energy consumed in a UKY study.

• Products to Avoid …..
  – “Space Age” or “Nanotechnology” paints and/or coatings. They don’t have the real R-value to significantly reduce heat transfer.
  – Bubble pack “insulation”. This product has no real R-value, but its cost is as high as a comparably sized sheet of foam insulation.

• What’s in the future …..
  – Alternative energy systems: photovoltaic (PV) systems to generate electricity from solar radiation.
  – PV system cost = $7/watt, but …
  – With Green Energy program (pays for half!) and tax credits, payback for a 65 kw system may be 4 years.
  – Let OPEC keep their oil!

• Any Questions?
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