Outlook of Environmental Controlled Housing System for India

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Agenda

- - Introduction
- - Historical temperature data for Hyderabad
- - Ventilation modes
- - Conclusion

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Introduction

It is not about telling ¨what to do¨... it is about explaining ¨why¨

- Our goal is not to tech you how to do the things!
- Our goal is to tech you WHY things should be done;

- There are 3 basic principles for a modern poultry house:
1 - Correctly calculate the equipment - All systems
2 - Correctly install the equipment once it has been properly dimensioned
3 - Operate all systems correctly

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Introduction

Ventilation is a science!!!

- It is studied as much as any other area, such as nutrition, genetics, animal health, etc.
- There are concepts within ventilation engineering that must be applied in practice to ensure the comfort and welfare of the birds.
- Once applied correctly, the performance of the animals will be better, reflecting in financial gains for the grower and the company.
- We 100% follow all the concepts of calculations and ventilation of the University of Georgia - Engineer Michael Czarick – www.poultryventilation.com

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What type of poultry will be produced?

Pullet?

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What type of poultry will be produced?

Breeders?

6

What type of poultry will be produced?

Broilers?

How many kg/m^2 do you want to produce?

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Where will these birds be raised?

In which part of the planet will these birds be found?

Hyderabad, Telangana, India

What are the climatic characteristics? Is it cold? Is it hot? Both?

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CLIMATE TABLE // WEATHER BY MONTH HYDERABAD

Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours

https://en.climate-data.org/asia/india/hyderabad/hyderabad-2801/

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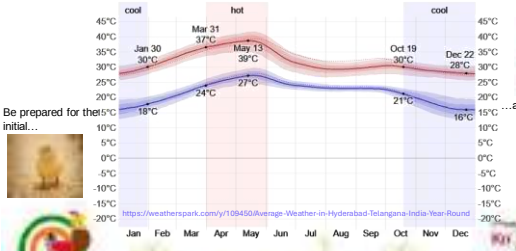
Average High and Low Temperature in Hyderabad



Be prepared for the initial…

…and final phase

Thinking in extremes!!!

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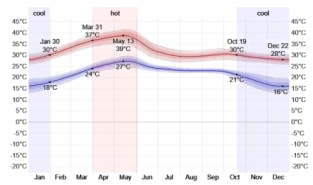
Lost heat and heat gain…

How much heat does poultry house loss during the cold wheater?



How much heat does poultry house gain during the hot wheater?

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Basic tunnel ventilation system design

38°C (>2,500kg)

Tunnel ventilation system:
Basic design criteria

1) House heat removal:
- adequate air exchange

2) Bird heat removal:
- proper air velocity;

3) Reduce the incoming air temperature:
- proper inlet air temperature.

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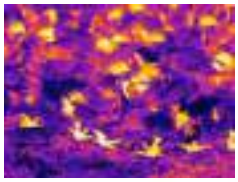
Tunnel Poultry house ventilation

1) House heat removal

- Quick exchange of air from inside the house with fresh air from outside;
- If not done... Temperature differences will occur between the ends of the inlet and exit of the house;
- Ideal is 2,8°C or 5°F.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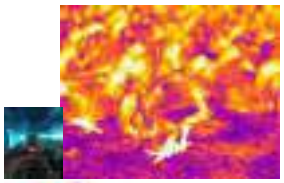
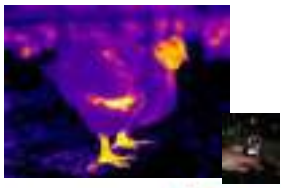
Tunnel Poultry house ventilation

2) Bird heat removal

- Fast moving air on the birds.

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Tunnel Poultry house ventilation

2) Bird heat removal

- Fast moving air on the birds.

If the air velocity is not adequate, the birds will experience heat stress and panting.

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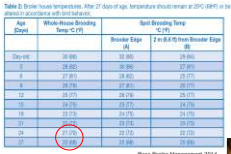
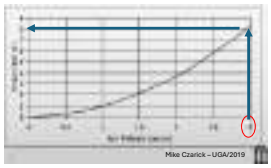
Tunnel Poultry house ventilation

Basic tunnel ventilation system design – Temperature vs air speed



Ross Broiler Management 2014



Mike Czarick – UGA/2019

29°C temperature (air)
Bird with 2,500kg

Comfort temperature
20-21°C

38°C (>2,500kg)

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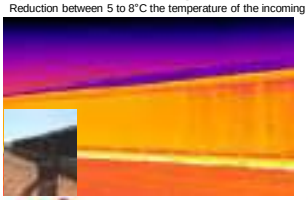
Tunnel Poultry house ventilation

3) Reduce the incoming air temperature pad cooling system;

Reduction between 5 to 8°C the temperature of the incoming air.

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Tunnel Poultry house ventilation

1) House heat removal

- The total heat absorbed by a house is the sum of the heat that enters through...
  - Ceiling/Roof
  - Side wall (Curtains or Wall)
  - End wall
  - Birds
  - Light (Lighting)

Heat Production

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Tunnel Poultry house ventilation

Heat Production – Roof or Ceiling

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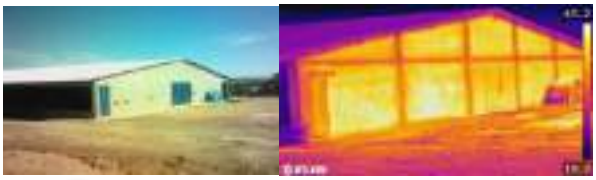
Tunnel Poultry house ventilation

Heat Production – End wall – Front the poultry house



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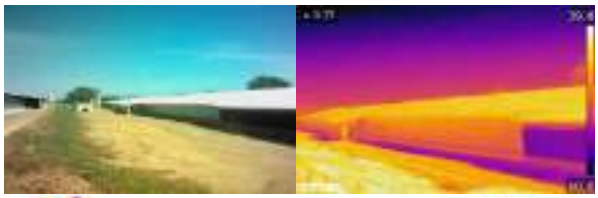
Tunnel Poultry house ventilation

Heat Production – End wall – Sidewall - Curtain



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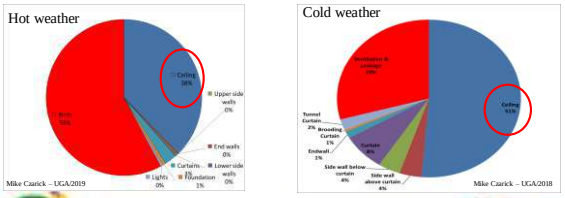
Tunnel Poultry house ventilation

Heat Production

Heat Loss



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Tunnel Poultry house ventilation

Heat Production – Great difference between one side per other side – WHY???

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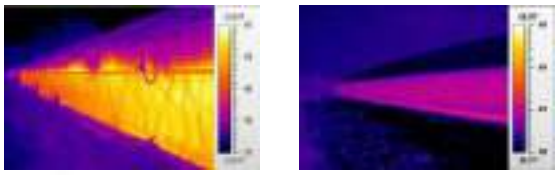
Thermal isolation

-Isolate the external variables that can interfere the control of the environment;
- Hot or cold.



Michael Czarick – UGA/2014

- **R-Value** is a measure of Thermal Resistance;
- Temperature difference through a thermal insulator;
- The higher the value, the better the insulation efficiency.

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Thermal isolation – DROP CEILING – 1st think that you should to protect


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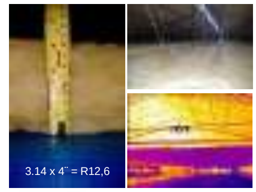
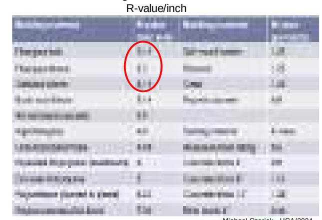
Thermal isolation – DROP CEILING – 1st think that you should to protect

1) House heat removal – Drop ceiling: R10 - 15



Materials in general used as insulators
R-value/inch



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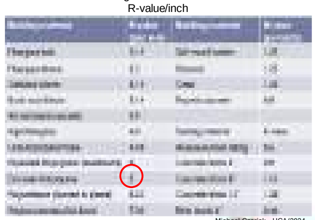
Thermal isolation – DROP CEILING – 1st think that you should to protect

1) House heat removal – Drop ceiling: R10 - 15

2 x 5¨ = R10

Materials in general used as insulators
R-value/inch



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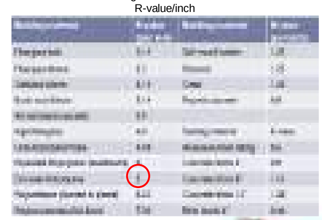
Thermal isolation – SOLIDWALL – 2st think that you should to protect

1) House heat removal – Drop ceiling: R5 - 10

5 x 2¨ = R10

Materials in general used as insulators
R-value/inch



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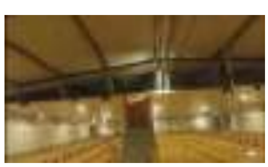
Environment – Modern Poultry house

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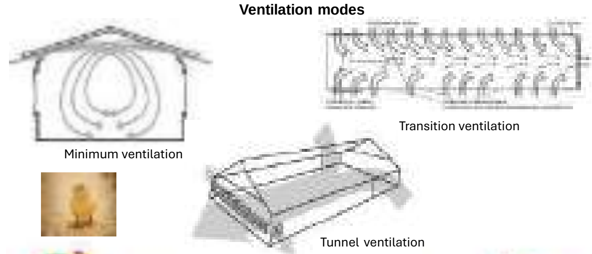
Ventilation modes



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Definitions

- First we need to define what cold and heat are.

We consider it cold or hot when the external temperature is lower/higher than what we want internally. Cold does not necessarily need to be 0°C, it can be 20°C.

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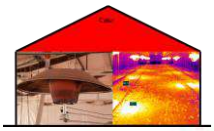
Heating

What is the most important temperature for the bird?

Floor temperature

-Contact surface of the bird with the environment;
- Greater exchange of your body temperature with the environment.



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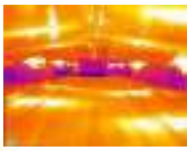
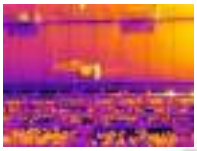
Heating

Temperature

- Promote a minimum of 32°C on the coldest days (nights) of the year;
- Control the minimum temperature of the poultry house;
- Regardless of minimum ventilation.





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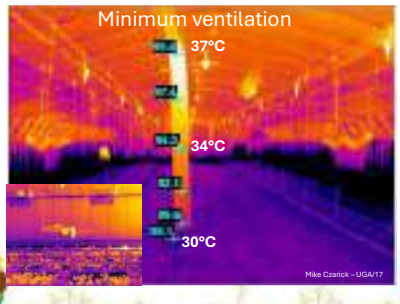
Minimum ventilation



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Sidewall inlet – Minimum and transition ventilation

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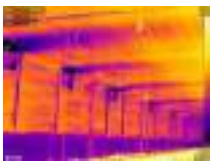
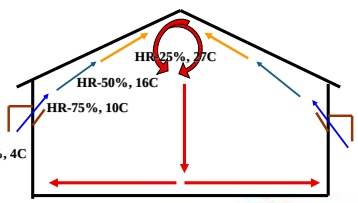
Sidewall Inlets - Principles





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Minimum Ventilation Mode

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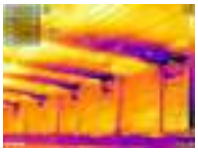
Environment – Temperature and air quality



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Resume

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Conclusion

- Applying the concepts of ventilation science and engineering according to temperature extremes (hot and cold) as well as the type of bird to be produced;
- A poultry house that operates in 3 ventilation modes is essential – Minimum ventilation, Transition ventilation and Tunnel ventilation;
- Thermal insulation, tightness and specific calculation of all systems will be essential for the ideal house;
- Once the systems have been dimensioned; The installation must be suitable for the correct operation of the calculated systems.

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Thank you!!!

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