



# Winter Management

Brendan Graaf – Cobb SA



ONE FAMILY.  
ONE PURPOSE.

# Presentation Outline

- Past Challenges
- Winter in the North
- New Challenges (Winter Challenges)
- Brooding
- Ventilation



# Past Challenges

- Summer issues:
  - struggling to keep birds cool is out!
  - high late mortality is out!
  - low growth in the last week is out!
  - over heating the chicks is out!
  - High water temperatures after the first week is out!
  - Wet litter is out!



# Winter in the North

- Summer:
  - Very hot
  - Rainy season
  - Thunder Storms
- Winter
  - Cold (very cold in some areas)
  - Dry (very little rain)



# Winter Challenges

- Brooding
  - Low ambient air temperatures
  - Low litter and floor temperatures
  - Low 7 day weights
  - High 7 day mortalities
  - Ascites?
- Ventilation
  - Air quality in 1<sup>st</sup> week (high CO<sub>2</sub>)
  - Air quality during rest of cycle
  - Wet Litter?





We need to be Mother Hen!



# Ambient Temperature

- Bird requirement does not change
- Recommended temperatures stay the same
- Actual set-points may need to change
- Management of heaters will need to change

Temperature/humidity guide:

Age - days	Relative Humidity %	Temperature °C (F) for chicks from 30 week old parent flocks or younger	Temperature °C (F) for chicks from 30 week old parent flocks or older
0	30-50	34 (93)	33 (91)
7	40-60	31 (88)	30 (86)
14	40-60	27 (81)	27 (81)
21	40-60	24 (75)	24 (75)
28	50-70	21 (70)	21 (70)
35	50-70	19 (66)	19 (66)
42	50-70	18 (64)	18 (64)

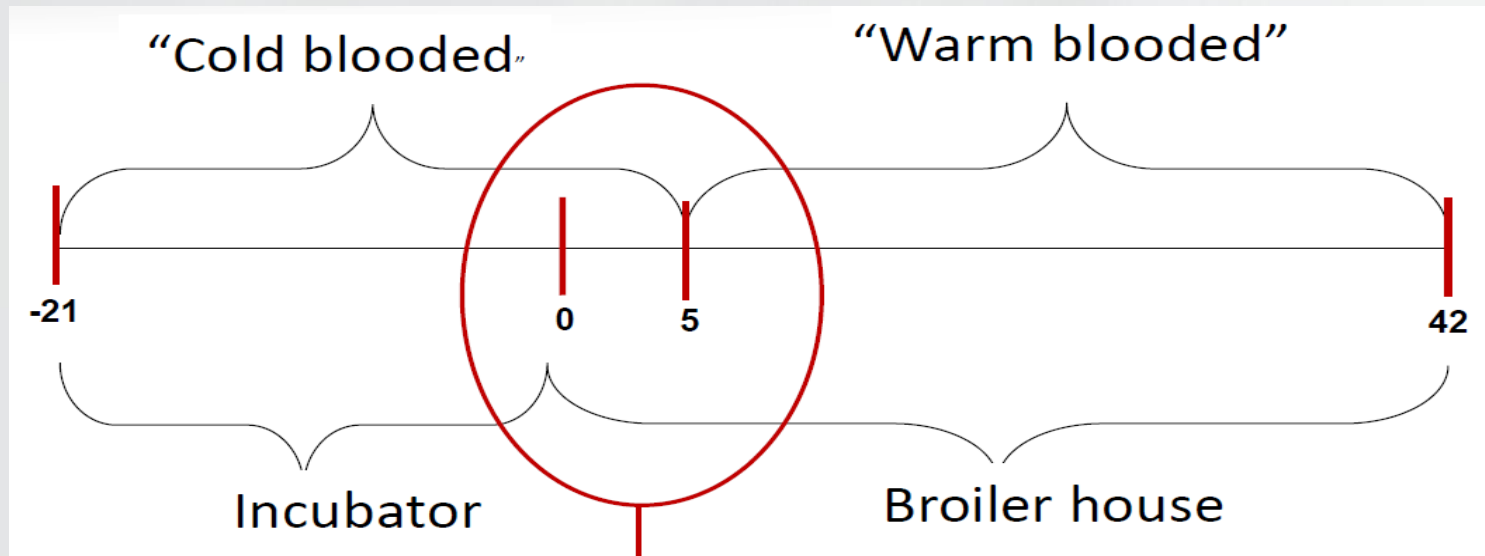
# Ambient Temperature

- Most Critical – Day 0
- Critical – 1<sup>st</sup> Week
- Less Critical – 2<sup>nd</sup> Week
- Room to play – Week 3 till End
- Need to measure ambient temperature inside the house not just at the controller

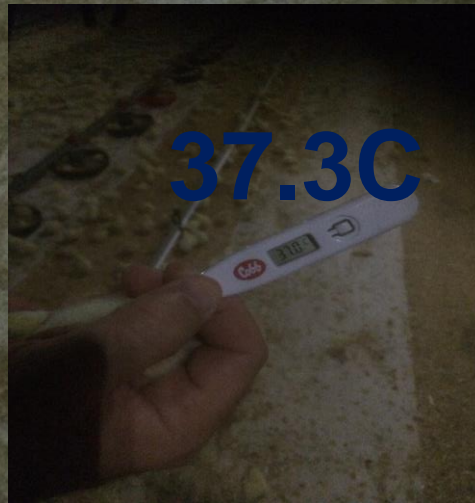


# Ambient Temperature

- Right temp for chicks to be active
- Need to achieve early feed and water intake
- Chicks become fully endothermic around 5 days old
- Start of metabolism releases heat helps keep chick warm  
(less non-starters = lower motility)



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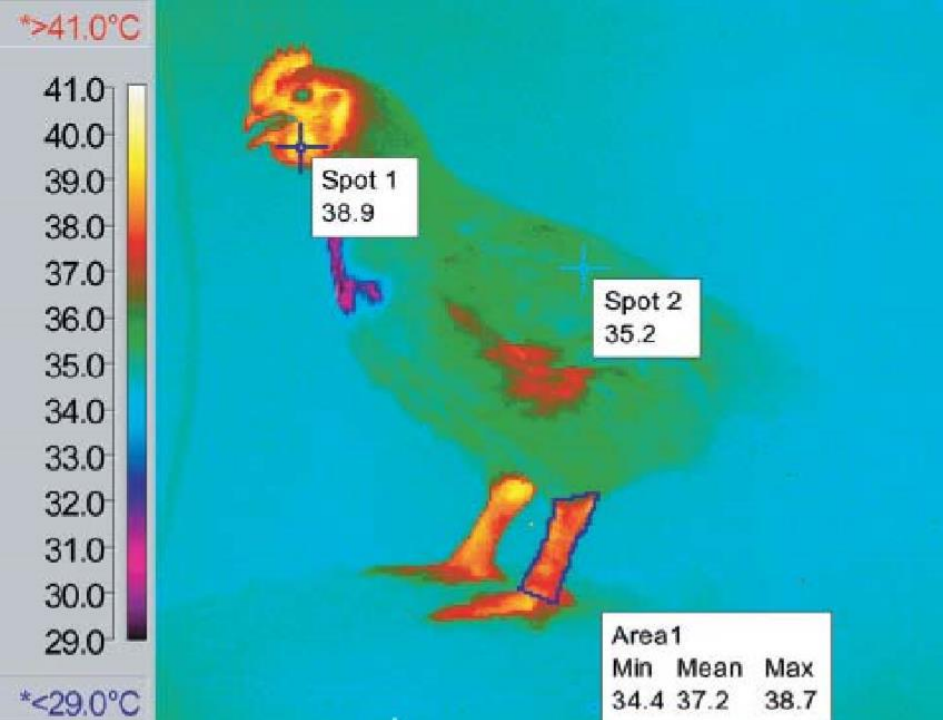


# Litter and Floor Temperature

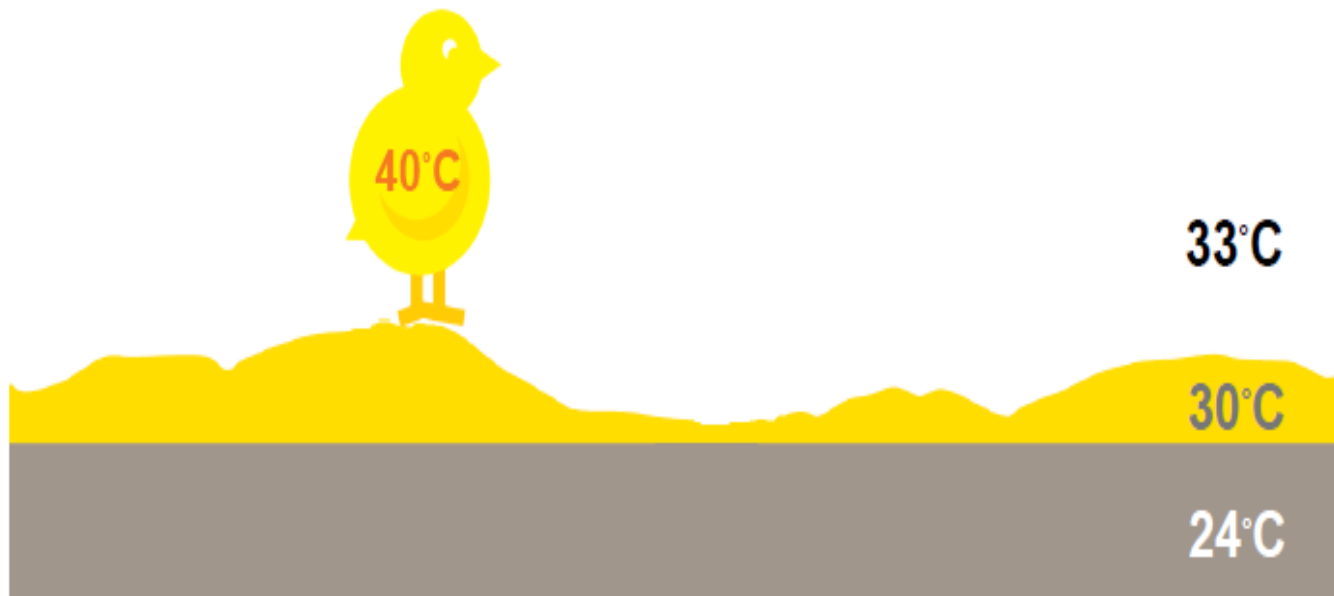
- Litter and Floor temperature requirements stay the same!





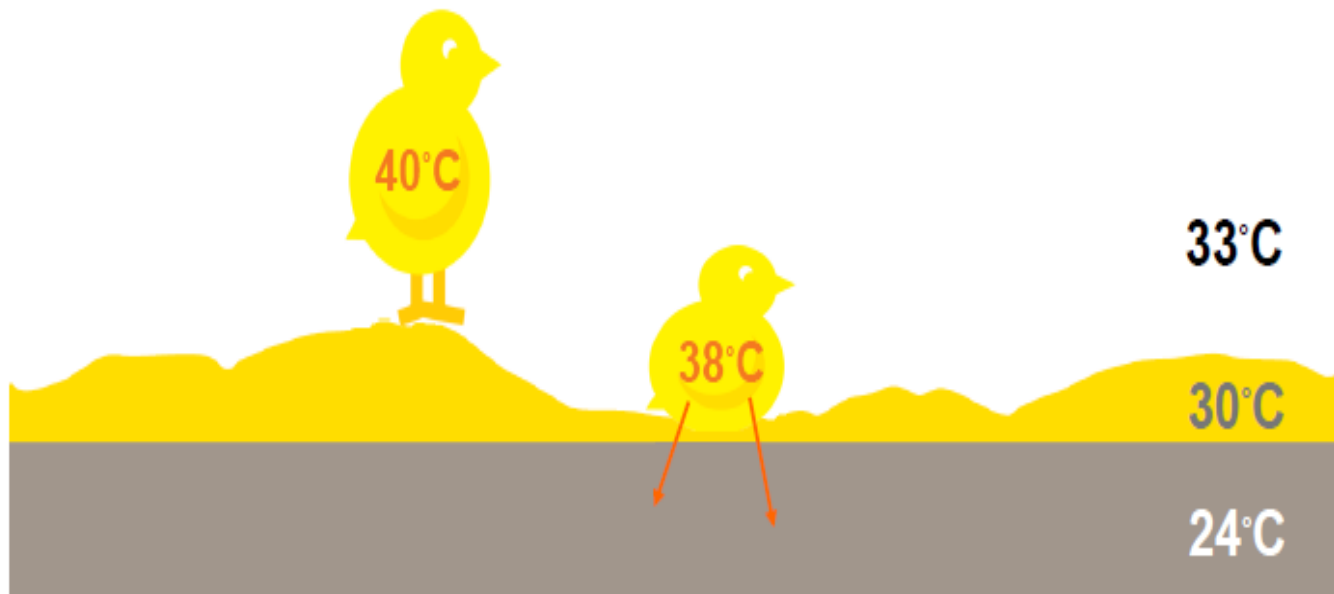


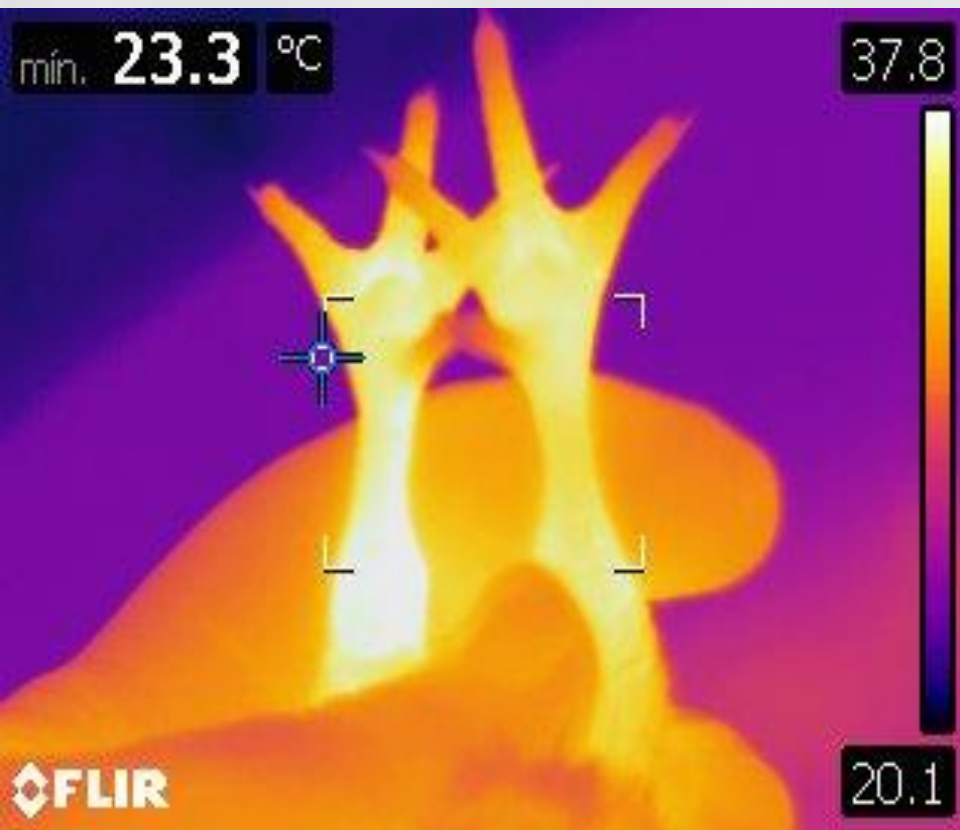
# Importance of floor temperature



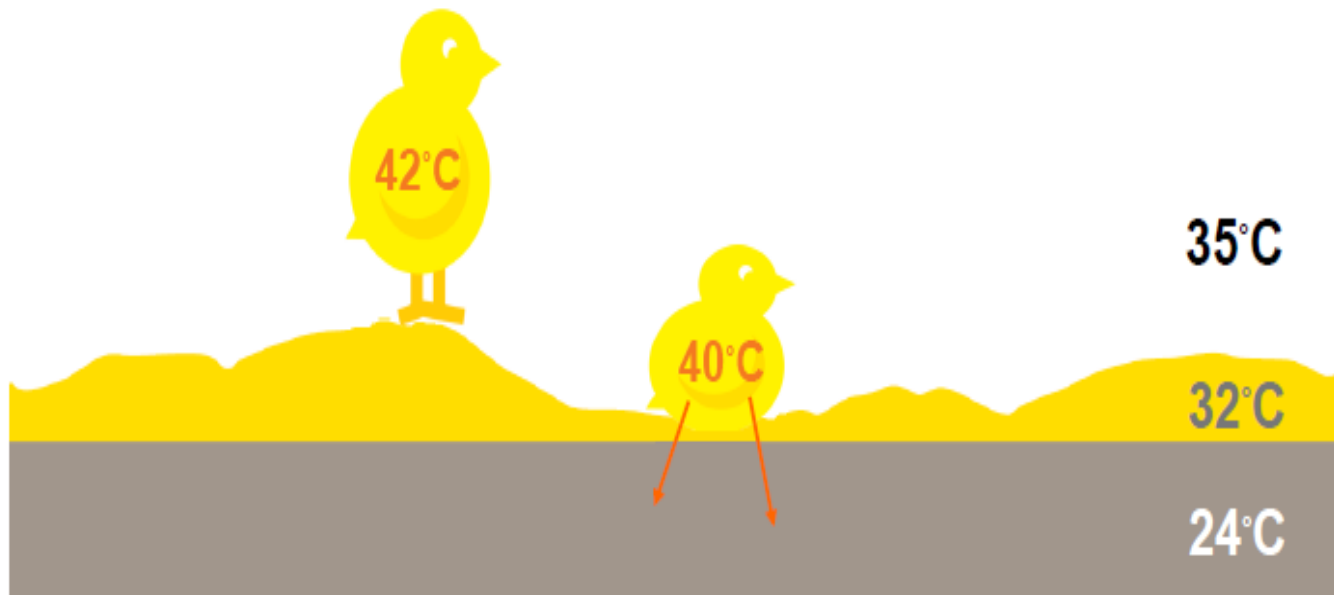


# Importance of floor temperature

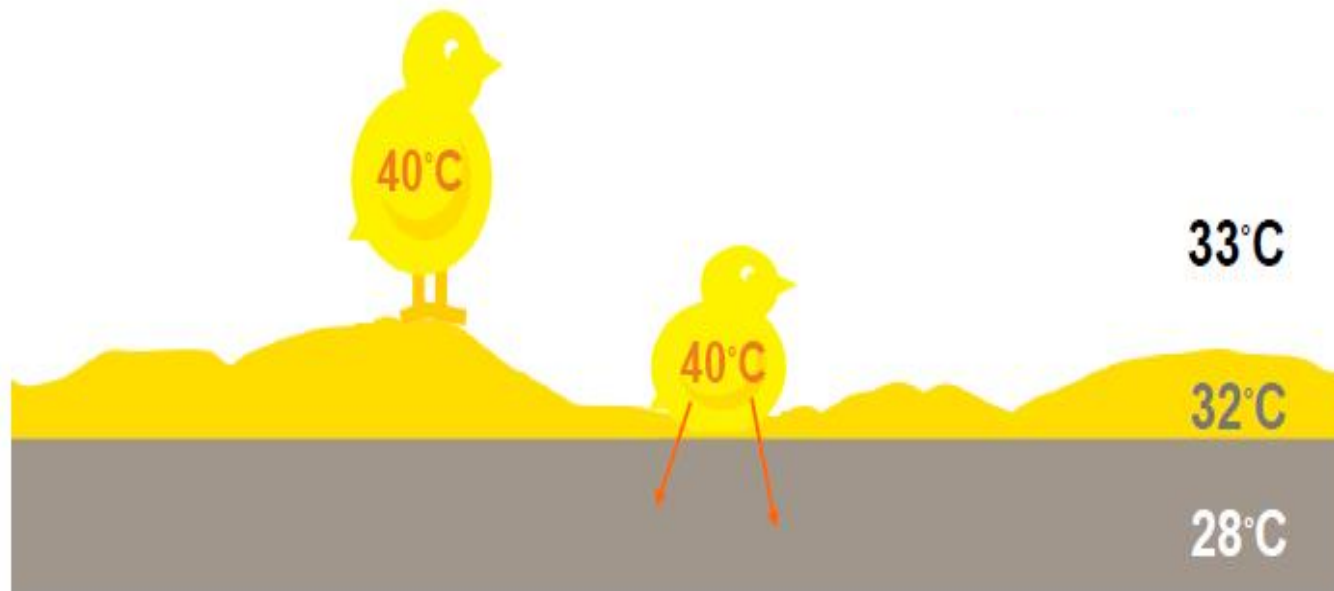




# Importance of floor temperature



# Importance of floor temperature



# Litter and Floor Temperatures

- Litter: 30 - 33°C
- Concrete/Floor: 28 - 30°C
- These are more difficult to achieve in winter
- Solutions to achieve these?



# Litter and Floor Temperatures

- Smaller brooding area
- Longer pre-heating period
- Higher pre-heating temperatures
  - Difficult to maintain in winter
- Pre-heating concrete/floor before litter is spread

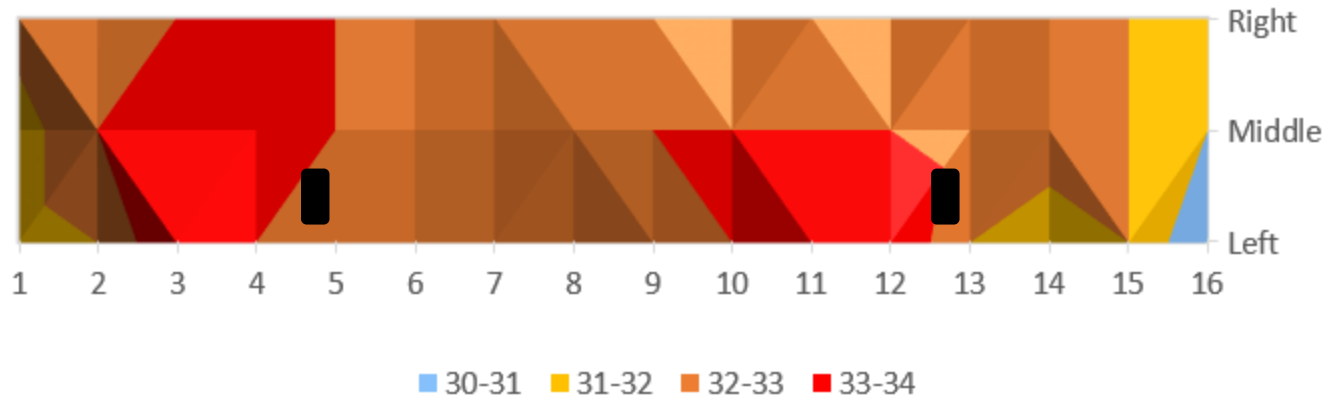


# Litter and Floor Temperatures

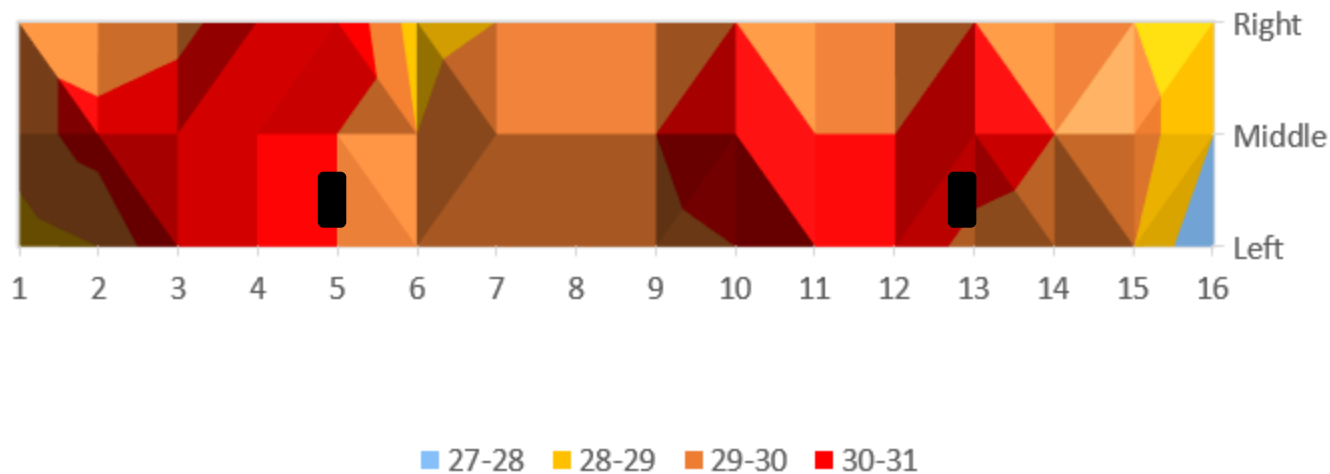
- Sealing of Houses
  - seal any cracks or openings around house
  - any leaks in roof or near doors
  - cover fans which aren't being used
- Maybe your farm can achieve correct temperatures and you don't need to change?
- Need to measure and know the capacities and limits of your farms



## Litter Temperatures House 1

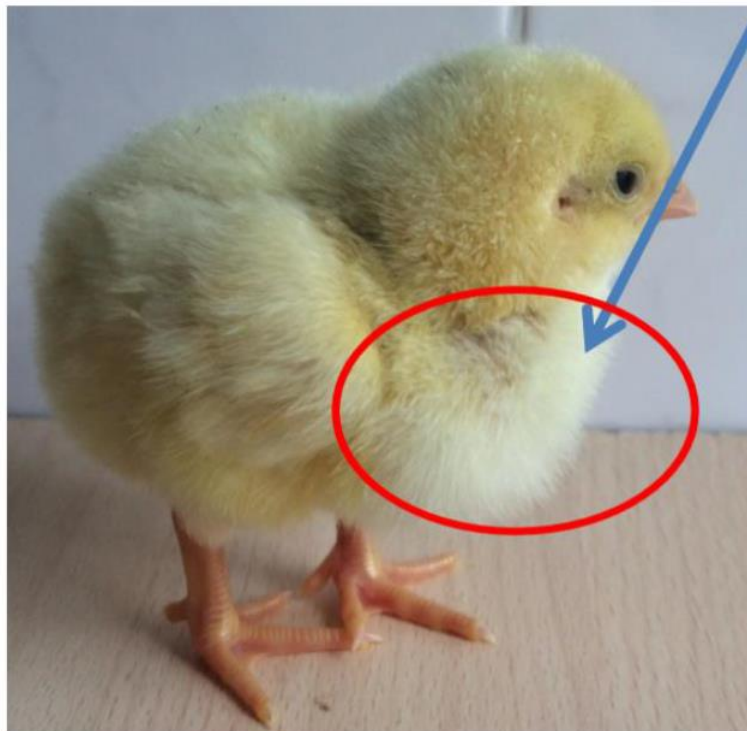


## Floor Temperatures House 1

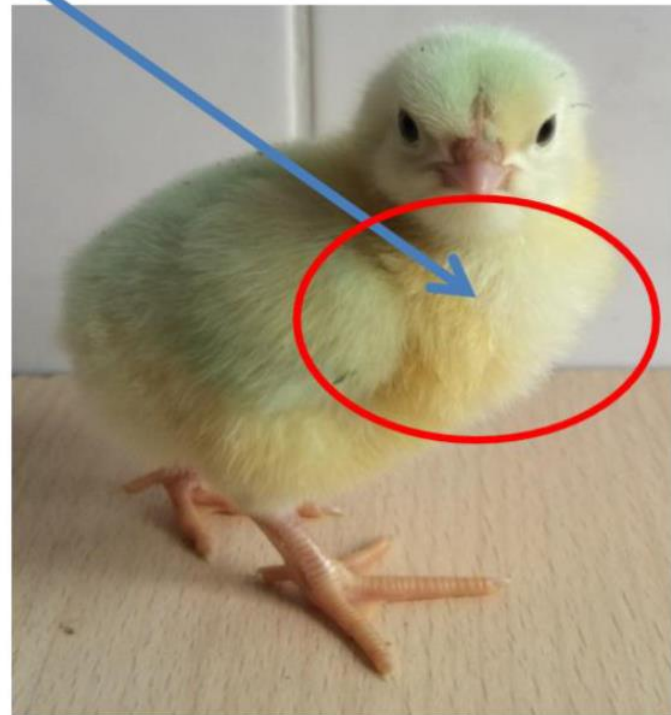


# Crop Fill

Feed and Water

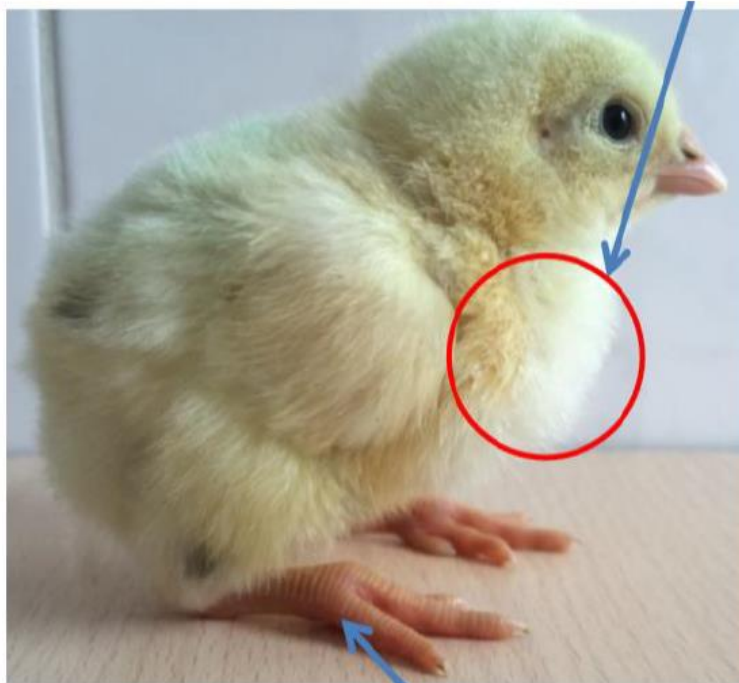


Water Only

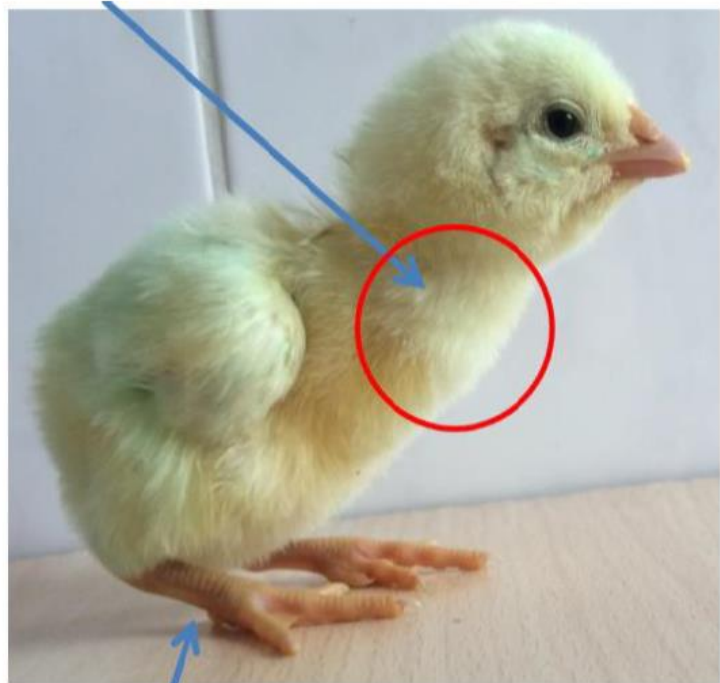


# Crop Fill

Feed only



Empty



Dehydration

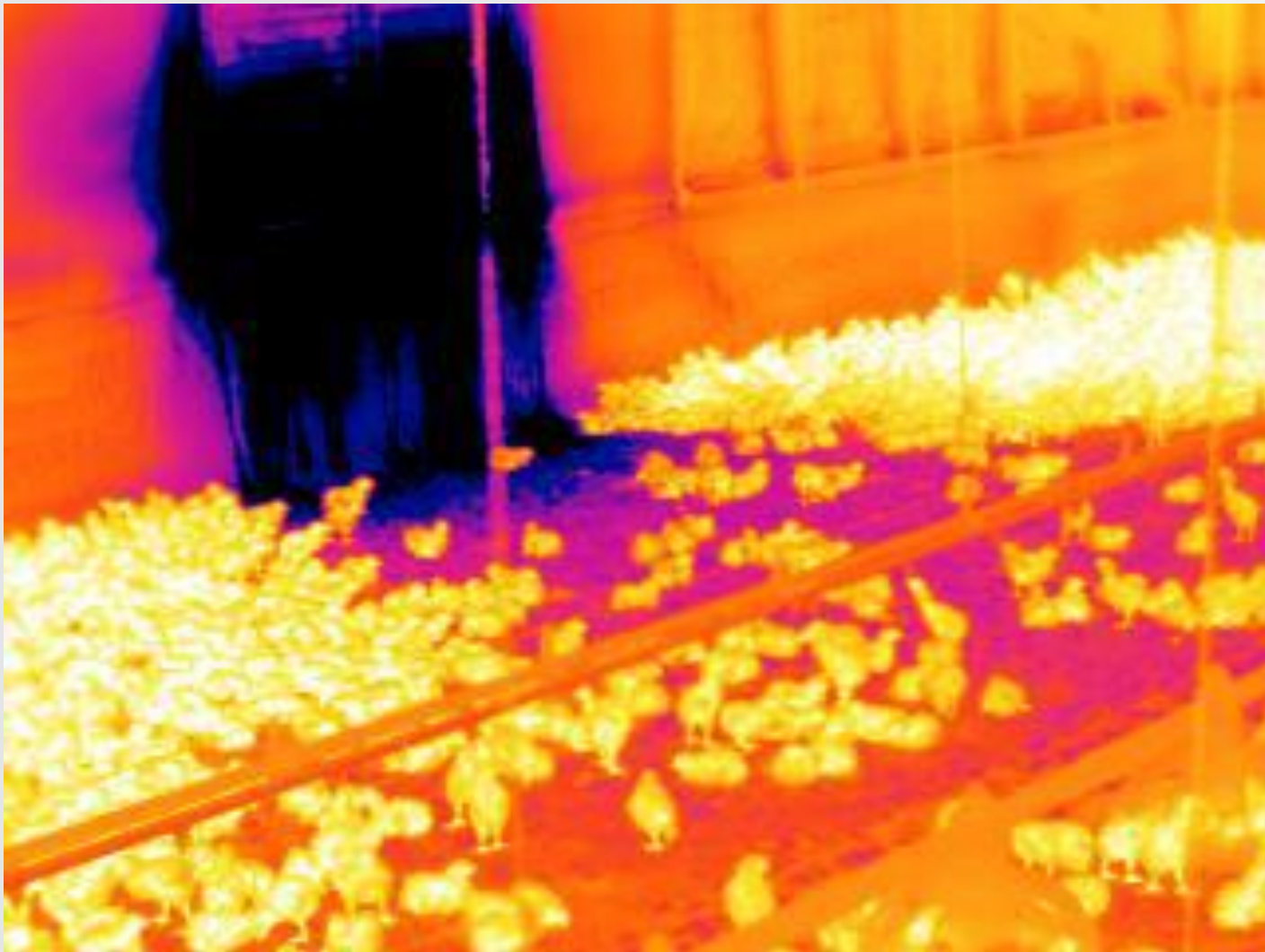


# Assessing Crop Fills

Hours after placement	Full Crop Target % (Water & Feed)
2	75
8	80
12	85
24	95
48	100

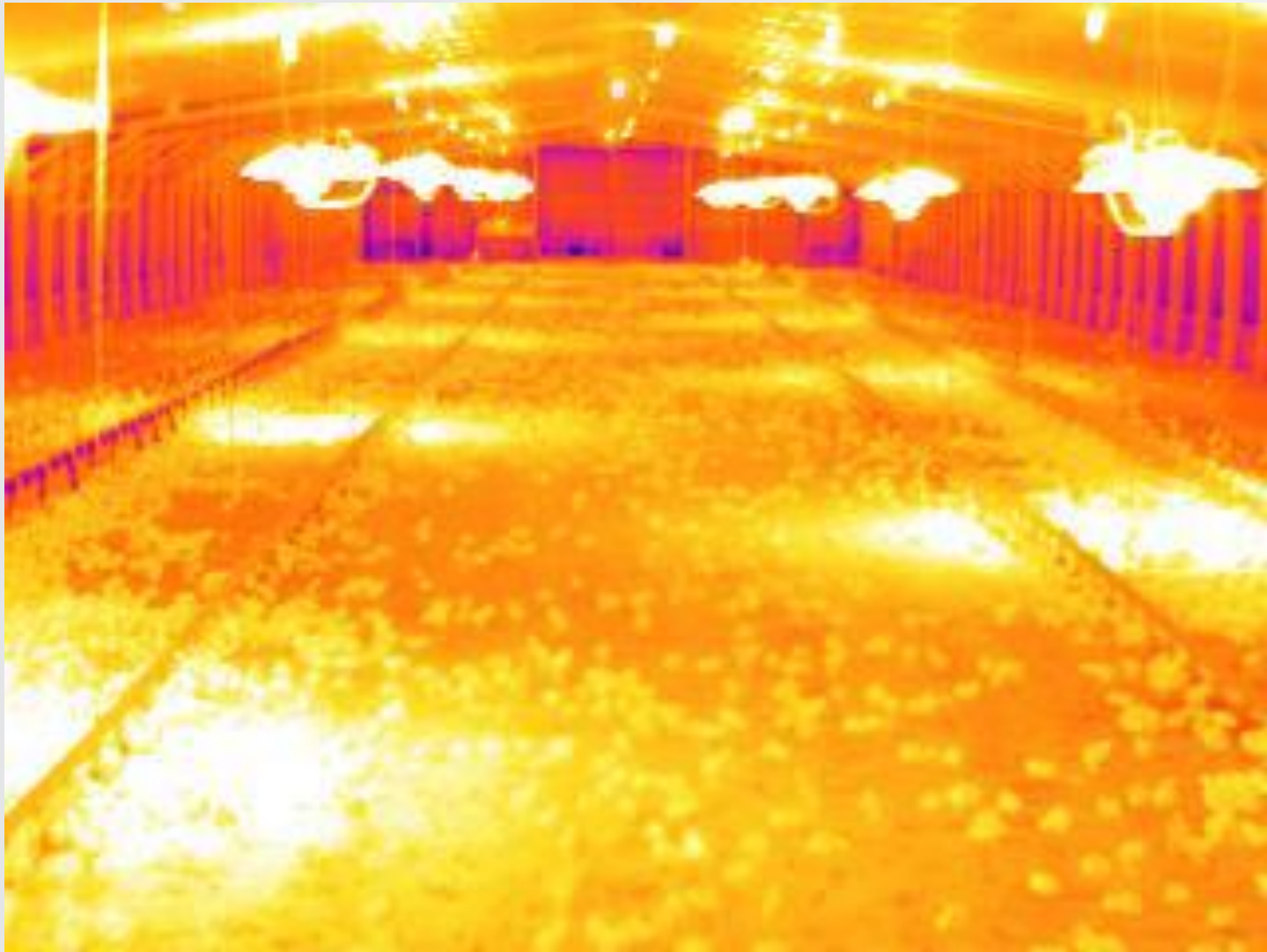














# House Temperatures

- Temperatures too cold:
  - Internal chick temperatures should be between 40 – 41°C
  - See by chicks behavior - huddling in groups around house
  - Set brooding area size to be able to maintain ambient house temperatures in the first week



# Beware High Temperature

- Don't over compensate
- High temperatures equally as bad!
- Won't want to eat = poor start
- Chicks can dehydrate quickly from panting (more culls = higher morts)
- Should not be a winter issue so don't let it be one
- We are looking for "Just Right"
- A chick is like Goldilocks





Too Hot

**Just Right!!**

Too Cold

# Feed Utilization

- Metabolism of feed leads to heat being produced by the chick
- As Temperature drops below comfort temperature, the chick must consume more feed to maintain its body temperature and stay comfortable
- E.g. Day old chick at 28°C requires 20% more energy than a chick at 33°C
- At 26°C the day old chick requires 50% more energy
- At 24°C the chick requires 200% more energy
- Below comfort temperatures will lead to higher FCR
- Feed is expensive, coal is much cheaper!



# Summer vs Winter – Performance Factors

	ADG	FCR	PEF
Summer	56.6	1.61	337
Winter	56.2	1.67	314



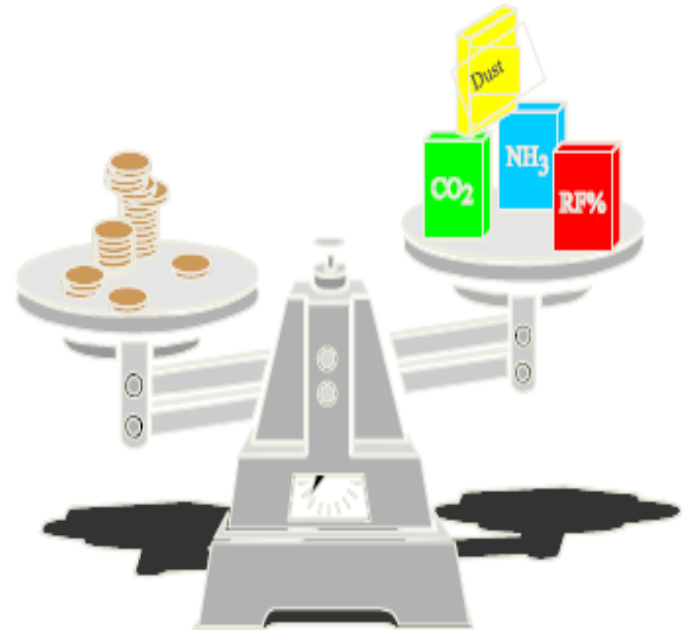
# Ventilation

- Specifically Minimum Ventilation
- What do the birds need
- What are the waste products we need to remove
- How do we measure and achieve this during winter



# What the bird needs 24/7

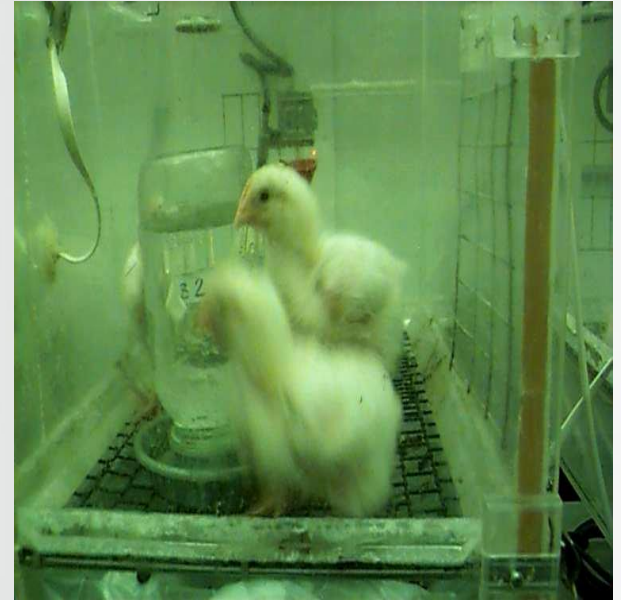
- Oxygen content of house air > 19.6%
- Carbon dioxide content of house air < 0.3% (3000 ppm)
- Carbon monoxide content of house air < 10 ppm
- Ammonia content of house air < 10 ppm
- Dust content in house air that can be breathed in < 3.4 mg/m<sup>3</sup>



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# Oxygen

- Oxygen is required in the production of heat and energy from feed to growth
- As Temperature drops below comfort temperature, the chick must consume more feed and OXYGEN to stay comfortable
- E.g. Day old chick at 28°C requires 20% more energy and 5% more oxygen than a chick at 33°C
- At 26°C the day old chick requires 50% more energy
- Only a 5% increase in demand for oxygen is required to cause ascites





# Chick sitting next to wall, but why?



# Carbon Dioxide

- Carbon Dioxide too high!
- House has leaks
- Birds sitting where fresh air is leaking in
- Cold, drafts, no feed and water
- Low activity





# Waste Product we need to Ventilate out

## ● Carbon Dioxide

- 100g chick produces 0.5g of Carbon Dioxide/bird/hour
- 2kg bird produces 5.4g of carbon Dioxide/bird/hour
- So a house of **42 000** birds at **100g** live weight produces **504kg** of Carbon Dioxide/day (not including possible production of CO<sub>2</sub> from the heating system)

# Levels of Carbon Dioxide

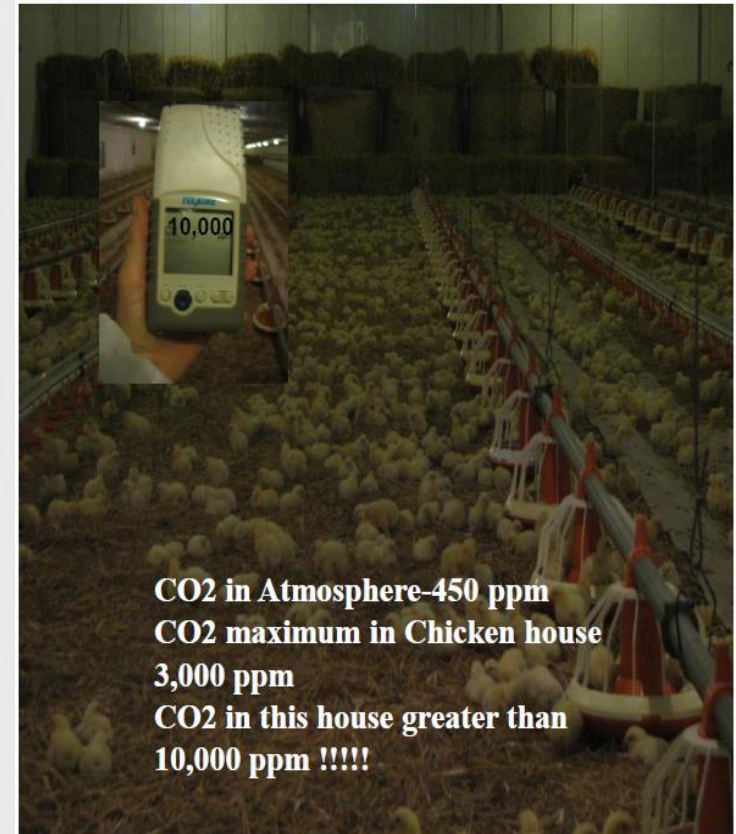
- The level of Carbon dioxide in the atmosphere is +/- 400 ppm
- Under good temperature control but with insufficient ventilation, carbon dioxide levels can exceed 10 000 ppm!
- You should never sacrifice temperature for ventilation
- You should never sacrifice ventilation for temperature
- Maximum Carbon dioxide levels at any time in the chicken house should not exceed 3000 ppm.



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# Effects of High Carbon Dioxide

- Reduced activity
- Lower feed/water consumption
- Higher incidence of dehydration
- Lower weight gain
- Increased incidence of right ventricle failure (Ascites)
- Bad farm performance in winter

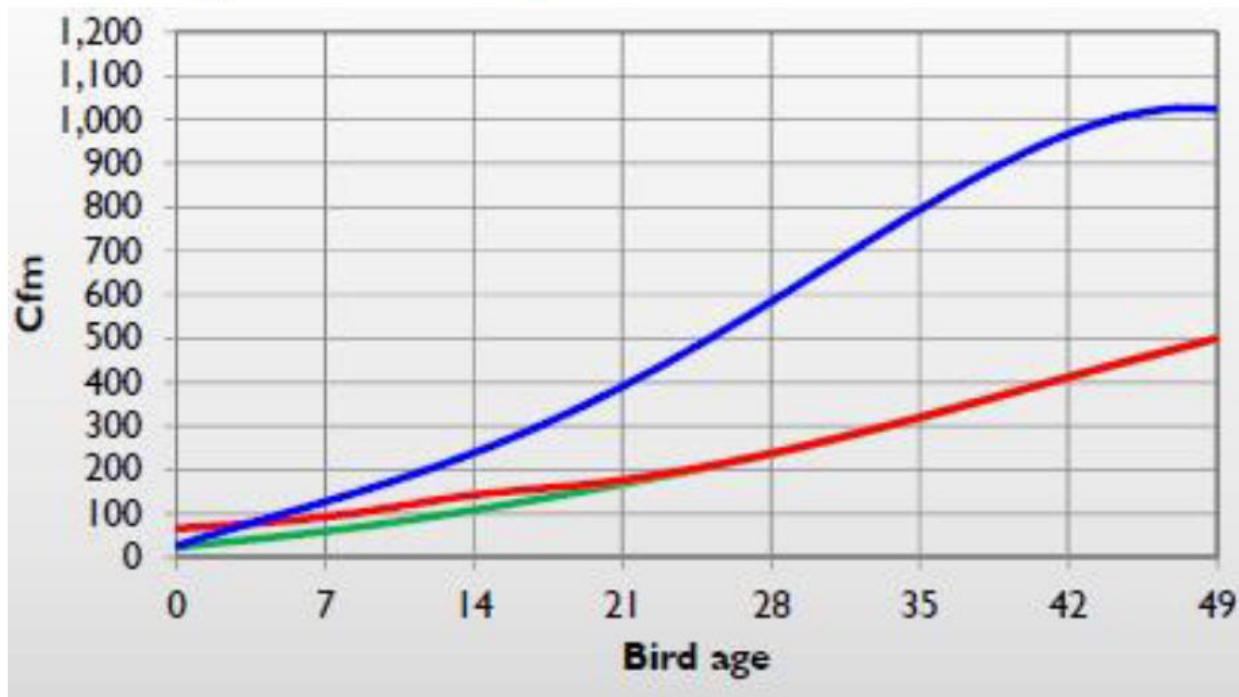


**CO2 in Atmosphere-450 ppm**  
**CO2 maximum in Chicken house**  
**3,000 ppm**  
**CO2 in this house greater than**  
**10,000 ppm !!!!!**



# Main concern in 1<sup>st</sup> week

Comparing Moisture & CO<sub>2</sub> Minimum Ventilation rates  
@ 5°C outside Temperature



— Bird CO<sub>2</sub> — Bird + Brooder CO<sub>2</sub> — Moisture Removal

# How do we manage it in winter

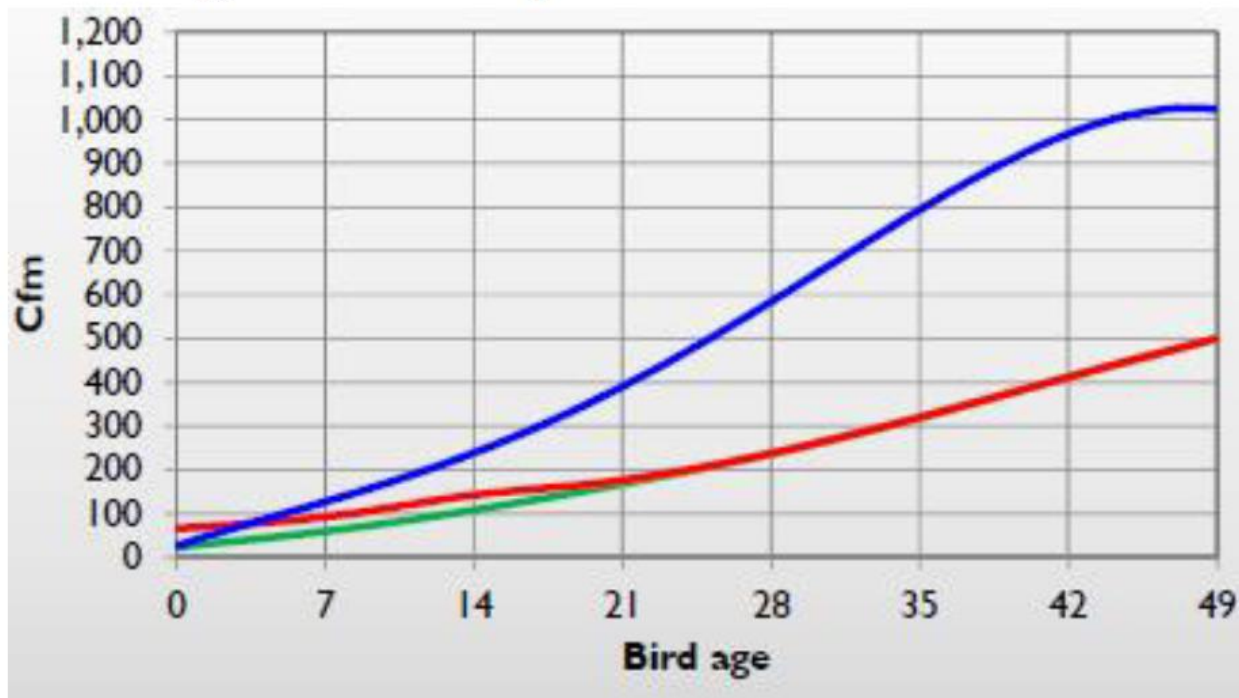
- Higher ventilation?
  - temperature control issues
- Enough ventilation to keep below 3000ppm
  - measure with CO2 meter
  - judge from chicks activity
  - know your fans/ventilation system
  - assess air quality by being in your houses





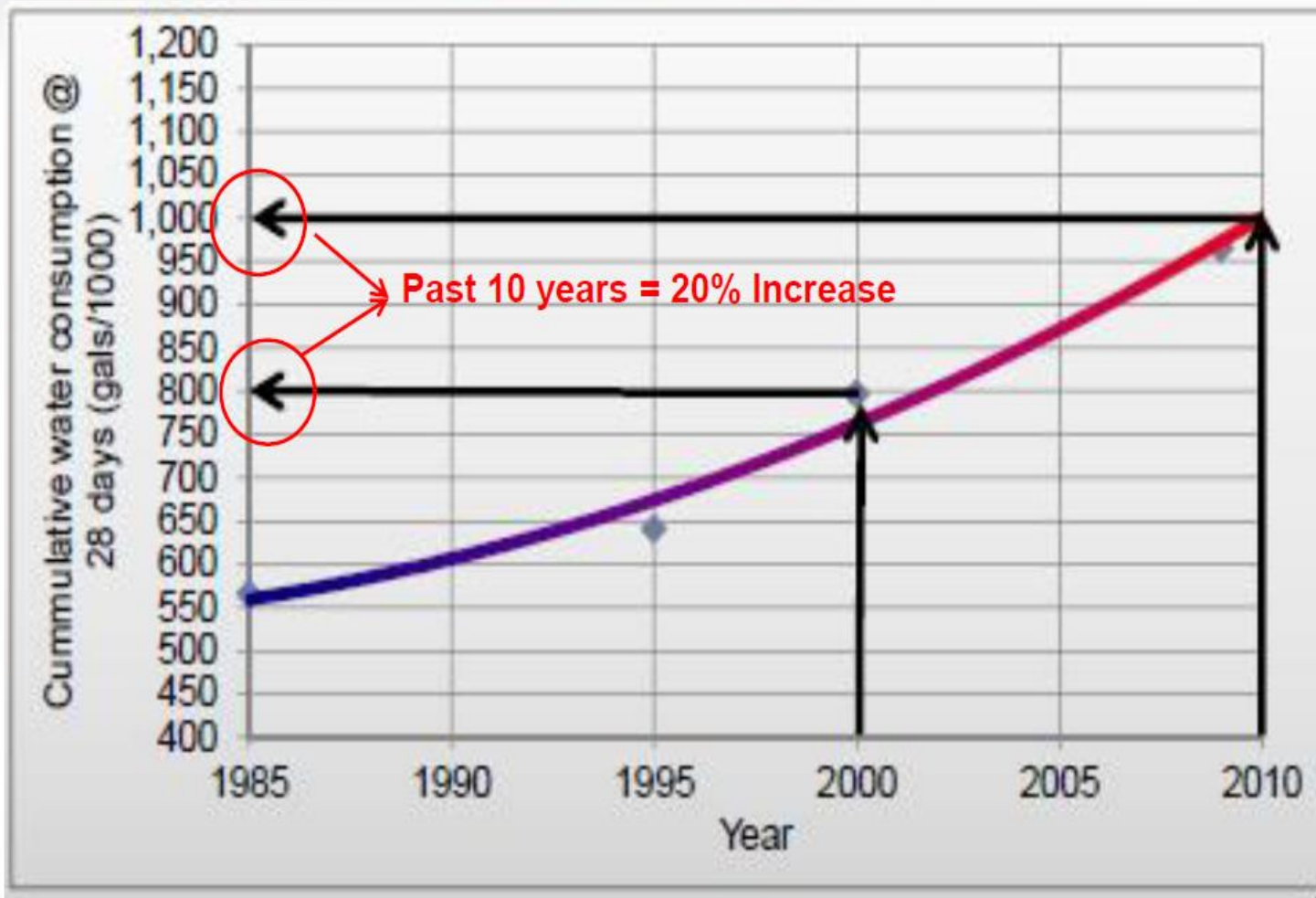
# Main concern in 2<sup>nd</sup> week till end

Comparing Moisture & CO<sub>2</sub> Minimum Ventilation rates  
@ 5°C outside Temperature



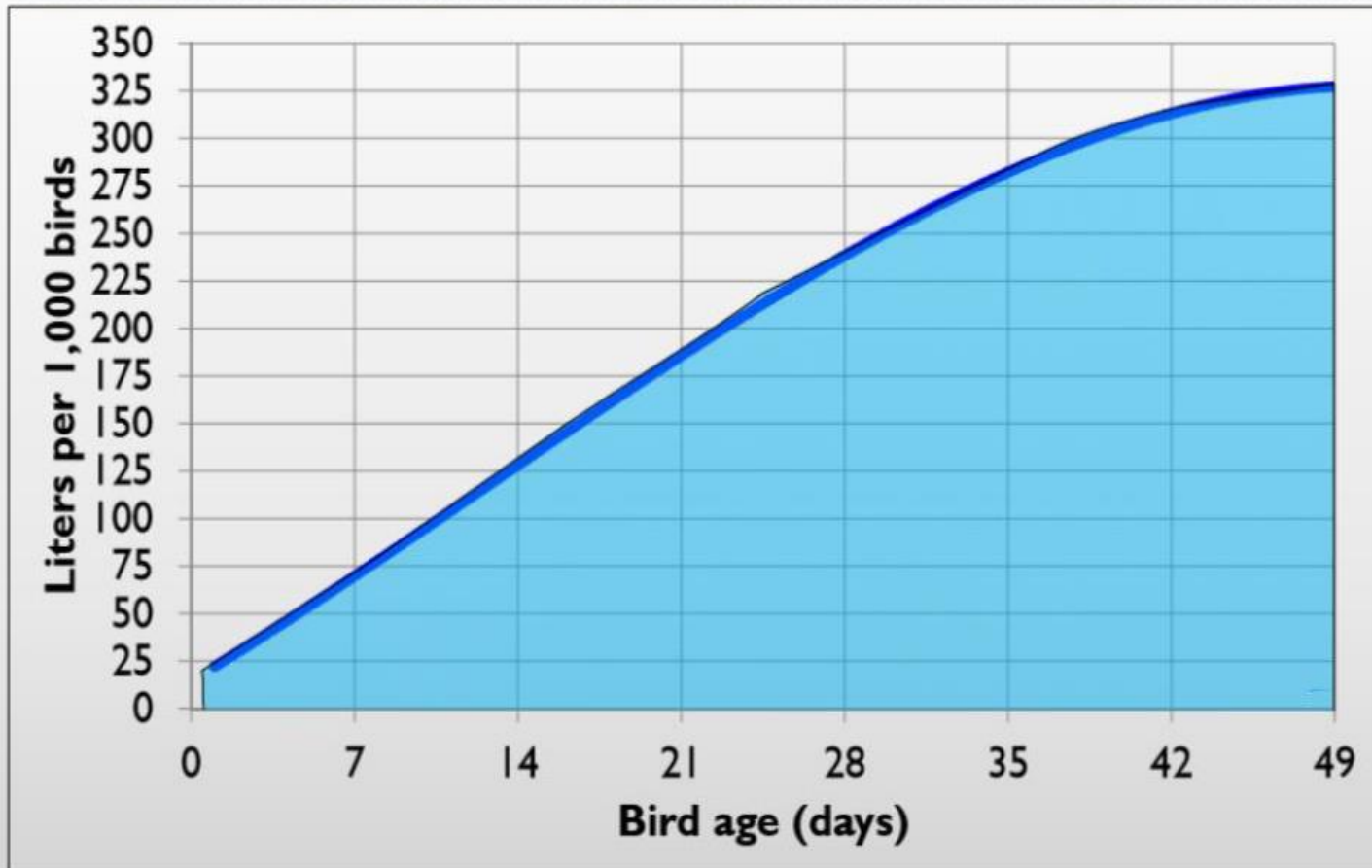
— Bird CO<sub>2</sub> — Bird + Brooder CO<sub>2</sub> — Moisture Removal

# Birds are drinking more



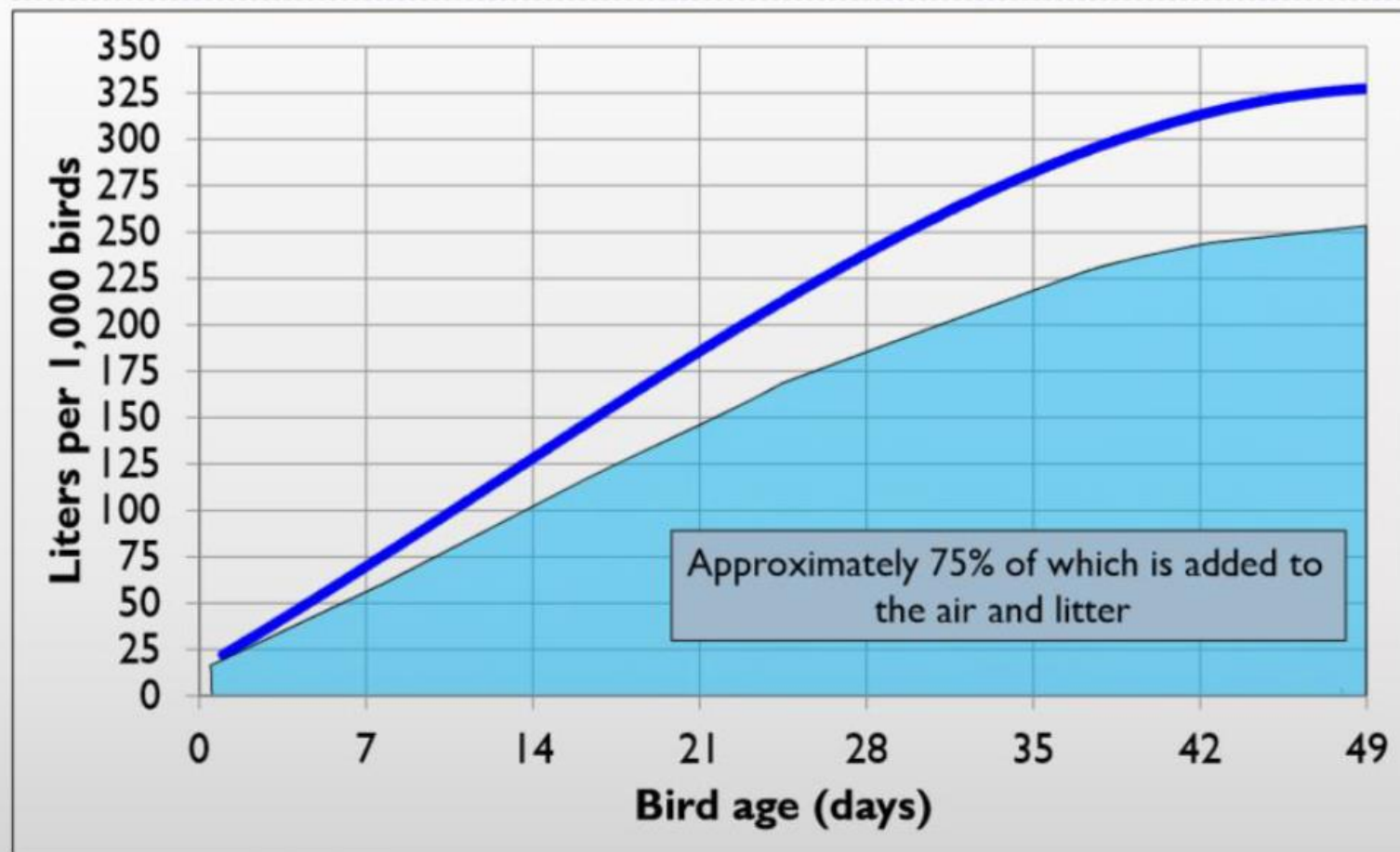
The University of Georgia  
College of Agricultural and Environmental Sciences  
Cooperative Extension

## Water consumed per 1,000 birds



The University of Georgia  
College of Agricultural and Environmental Sciences  
Sustaining Education

# Water added per 1,000 birds



# Moisture Control

## • Moisture

- 100g chick at 30°C produces 1.3g of water/bird/hour
- 2kg bird at 18°C produces 8.5g of water/bird/hour
- So a house of **42 000** birds at 2kg live weight produces **8400** litres of water/day



# Wet Litter

- Wet litter has a moisture content greater than 45%
- Capped litter traps moisture and noxious gases and cause hock burn, footpad dermatitis and breast burns in severe cases
- Wet litter is a welfare and production issue
- Dry litter has a moisture content less than 35%
- Dry litter breaks up easily and allows moisture release and this moisture can subsequently be removed by the ventilation system



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# Drinker Line Pressures

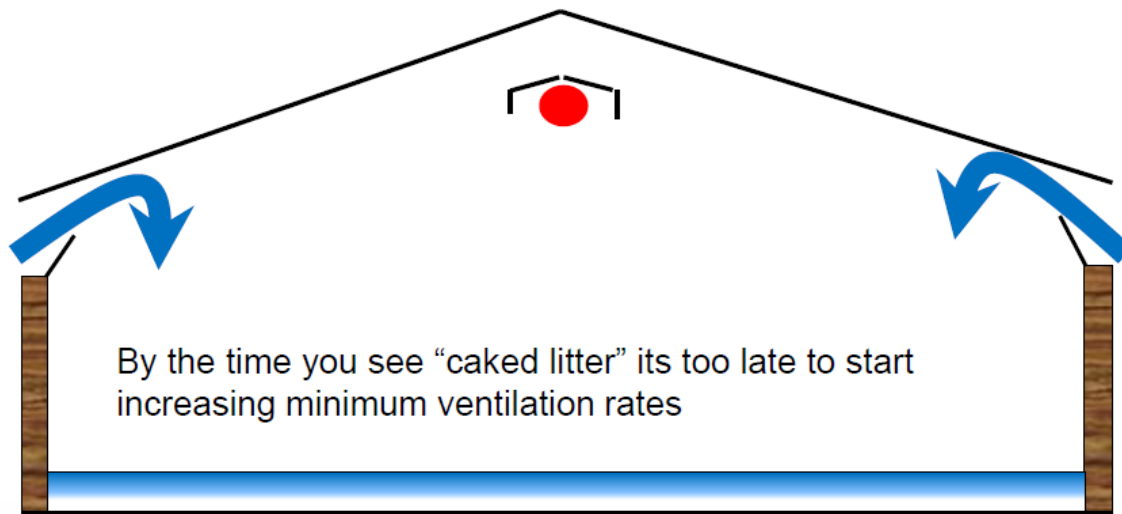
- Can measure it using flow rate meter
- Look at the litter quality under the drinker lines
- If the litter when picked up and squeezed forms a solid mass and then dropped onto the ground does not break up – the litter is too wet and pressure is too high
- The pressure should then be dropped and litter quality monitored
- Be careful that it is a pressure issue and not a nipple issue



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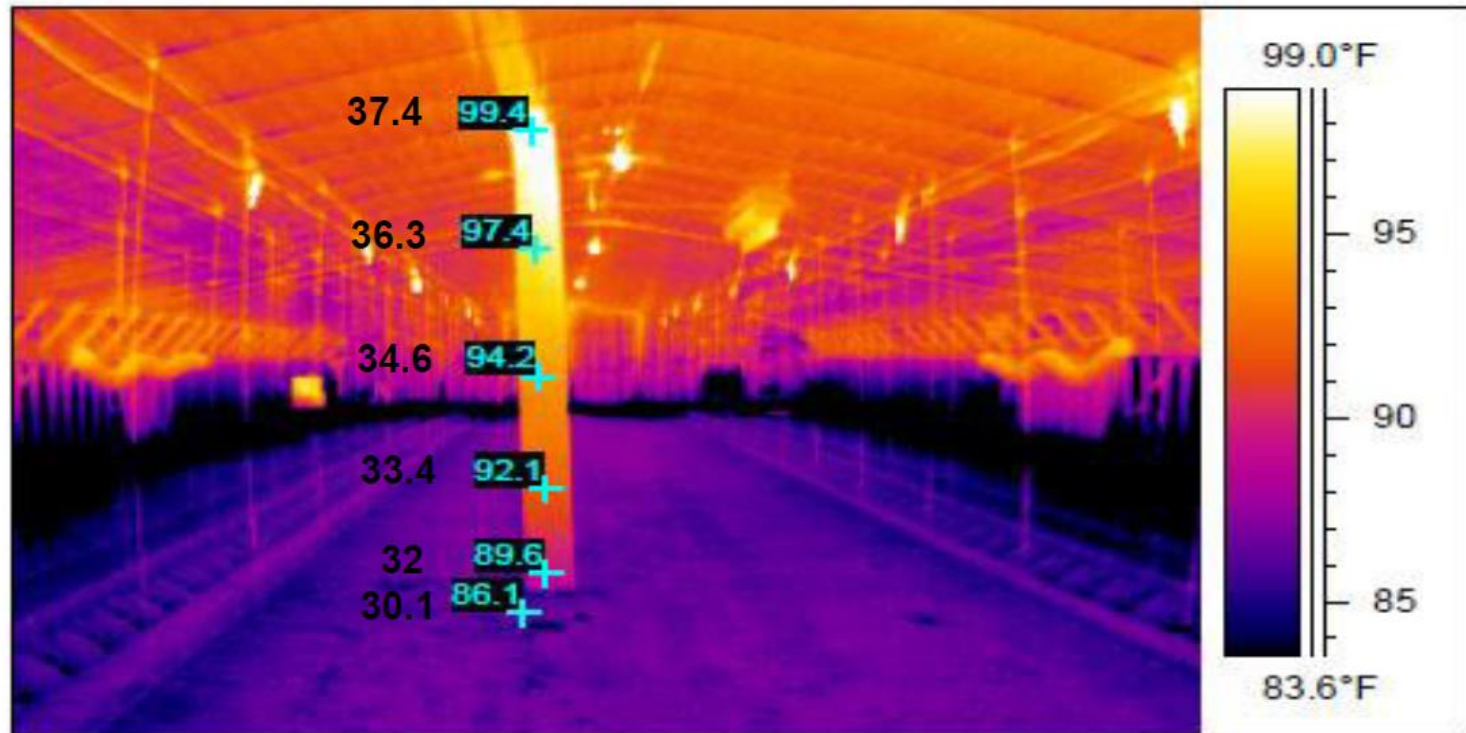
# Managing Litter Moisture

- Litter is like a sponge!
- A sponge with limited water holding capacity.
- Birds are constantly adding moisture



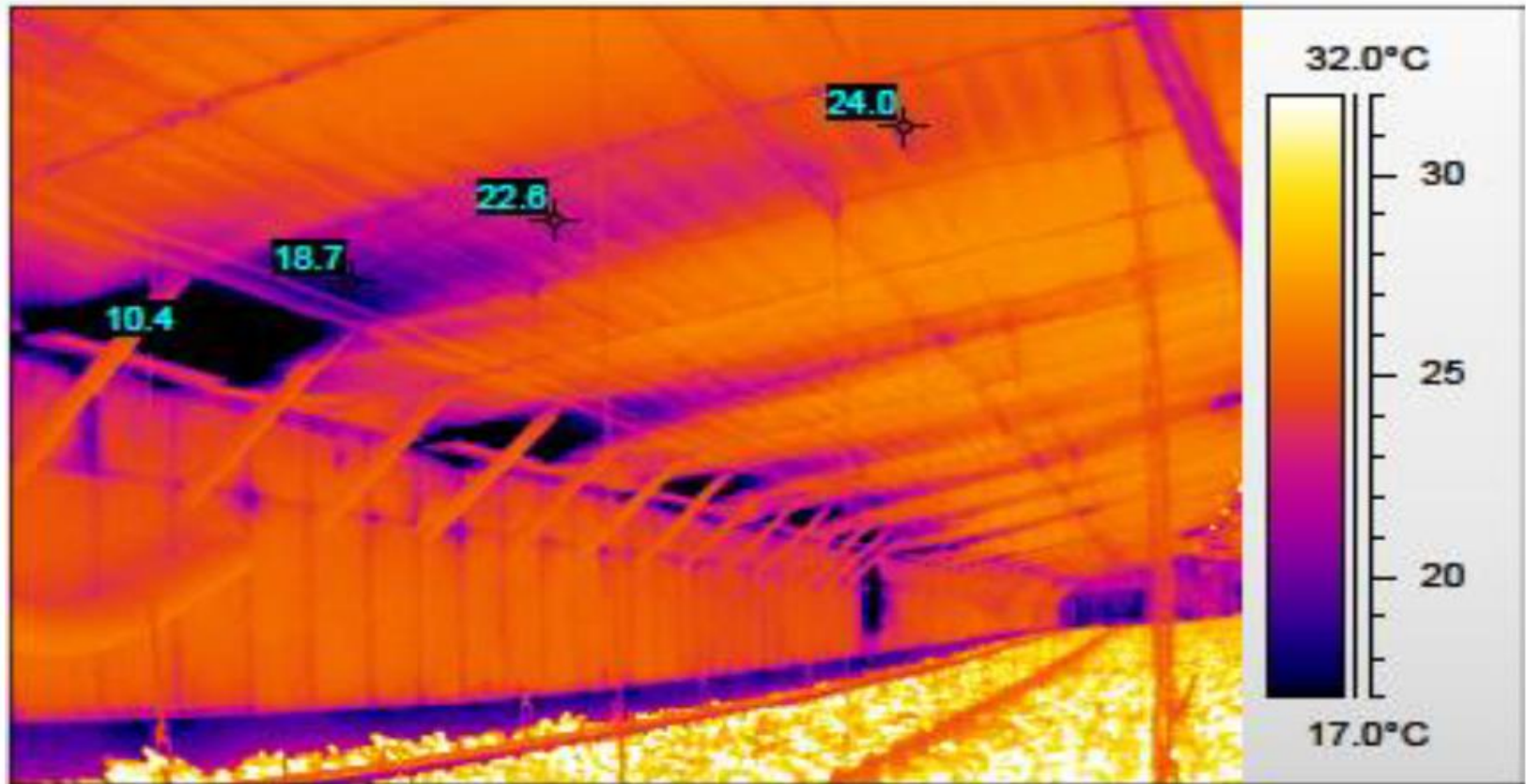
# Stratification

- Stratification during brooding – about 2-6°C per m





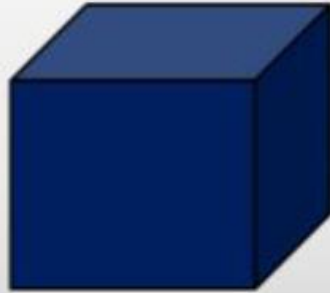
# Air Conditioning





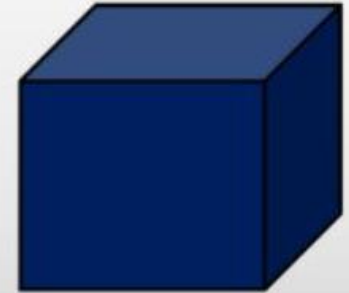
## 5°C Air

- ▶ The maximum amount of water 100 cubic meters of air can hold is 600 ml
- ▶ When it is 5°C and 100% we know that for every 100 cubic meters we bring in 600 ml of water.
- ▶ This cold, damp air will not do any drying because it is holding all the water it can.



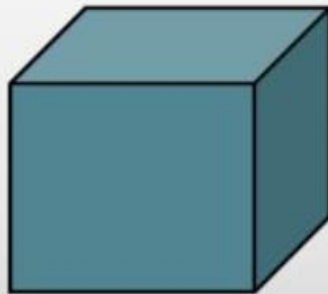
## 15°C Air

- ▶ The maximum amount of water 100 cubic meters of air can hold is 1,200 ml
- ▶ So if we take 5°C air with a Rh of 100% and heat it to 15°C the relative humidity will decrease to 50%



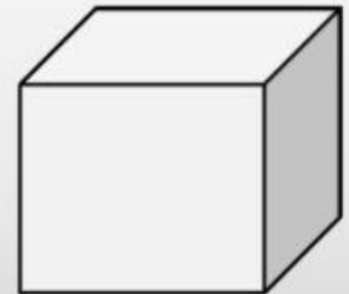
## 25°C Air

- ▶ The maximum amount of water 100 cubic meters of air can hold is 2,400 ml
- ▶ 600 ml = 25%

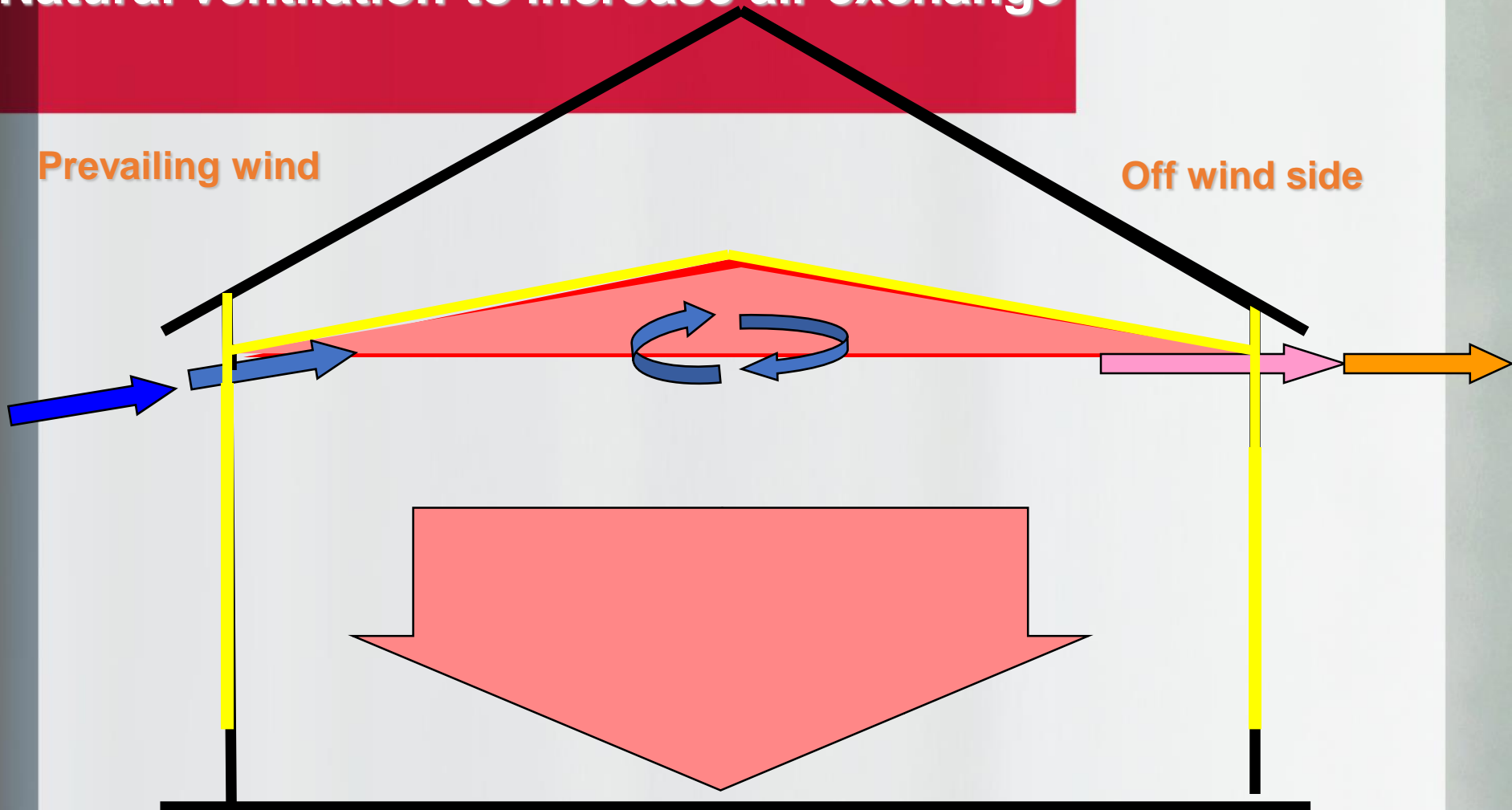


## 35°C Air

- ▶ The maximum amount of water 100 cubic meters of air can hold is 4,800 ml
- ▶ 600 ml = 12.5%



# Natural ventilation-to increase air exchange



To increase house air exchange, curtain on the off wind side should be open at least four times the on wind side



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# Poor Curtain = Poor Performance!



# Winter Moisture Control

- Birds are adding lots of moisture
- Drinker system adding moisture
- The only thing that can remove all this moisture from a chicken house is higher air exchange
- But that means more ventilation which means lower temperatures which is our earlier issue so now what?



# Winter Moisture Control

- Any day when the sun is out during winter and the temperatures are not too cold TAKE ADVANTAGE!
- Increase your ventilation rates (higher air exchange)
- Depending on bird age temperature set-points can allow some leeway
- Monitor bird activity
- Turn litter during this higher ventilation period





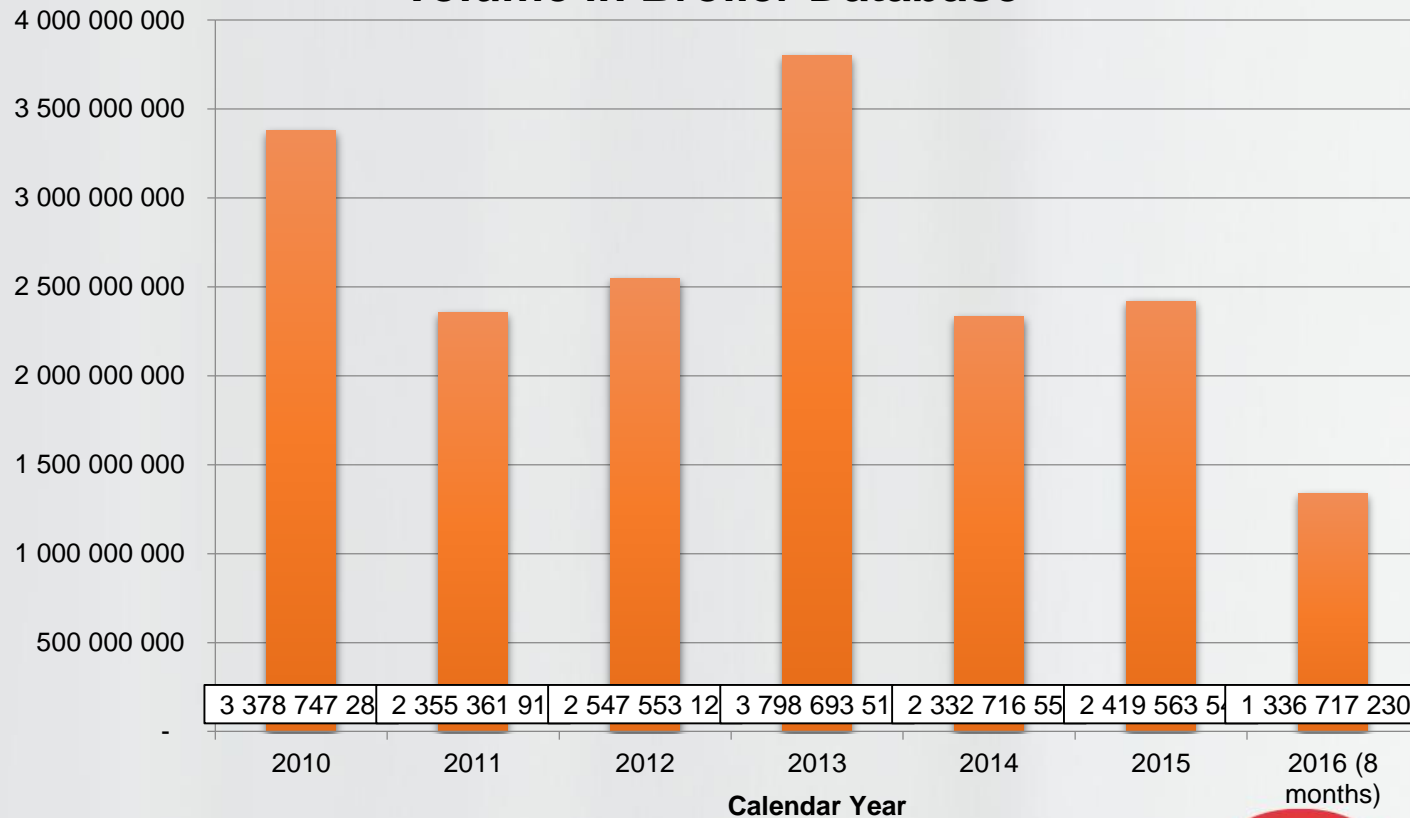
# Winter Moisture Control

- All of these points will be at your discretion
  - If you understand the basic principles you don't have to be afraid to make the required changes
- Be Passionate
- Be Pro-active
- Be Productive
- Be Skilled Chicken Farmers



# Broiler Trends - EMEA

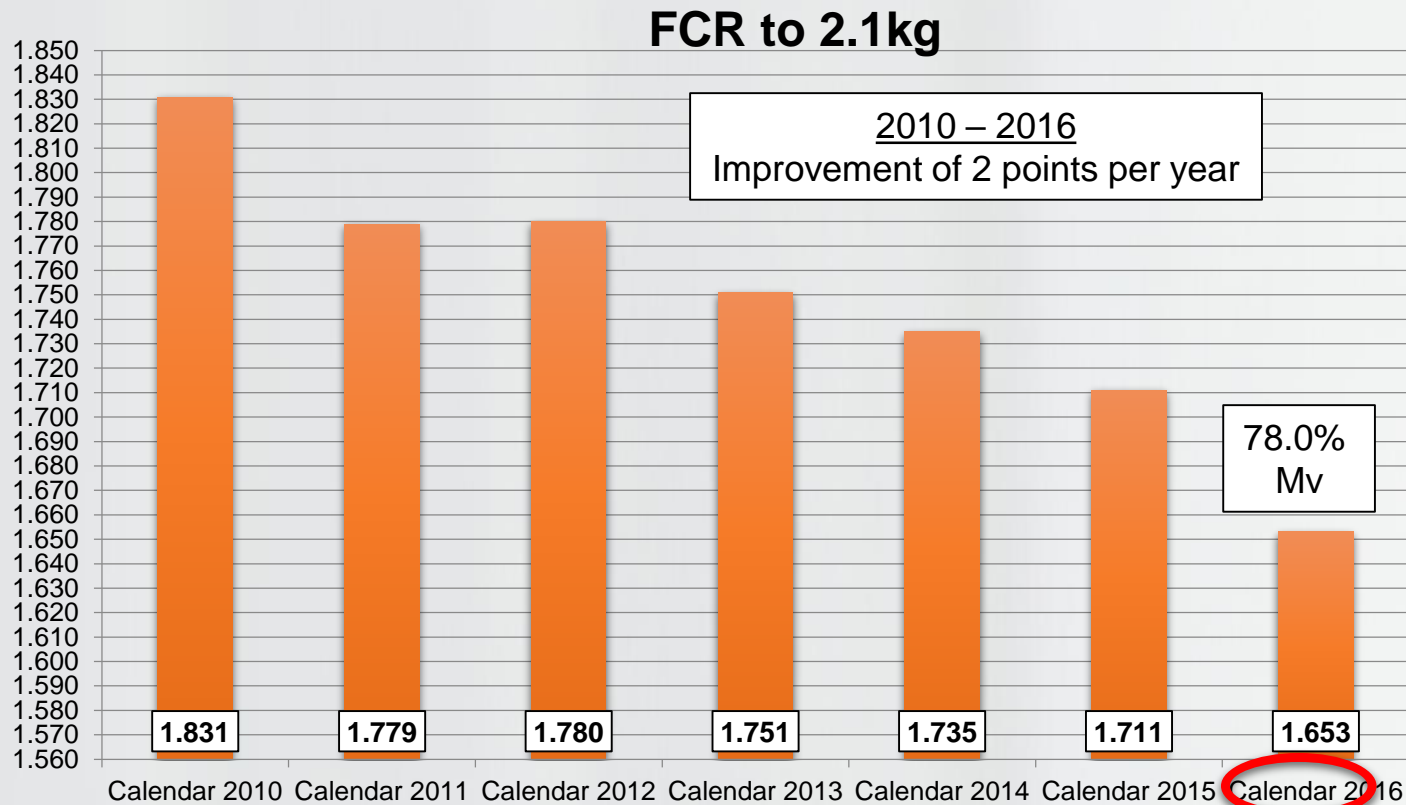
## Volume in Broiler Database



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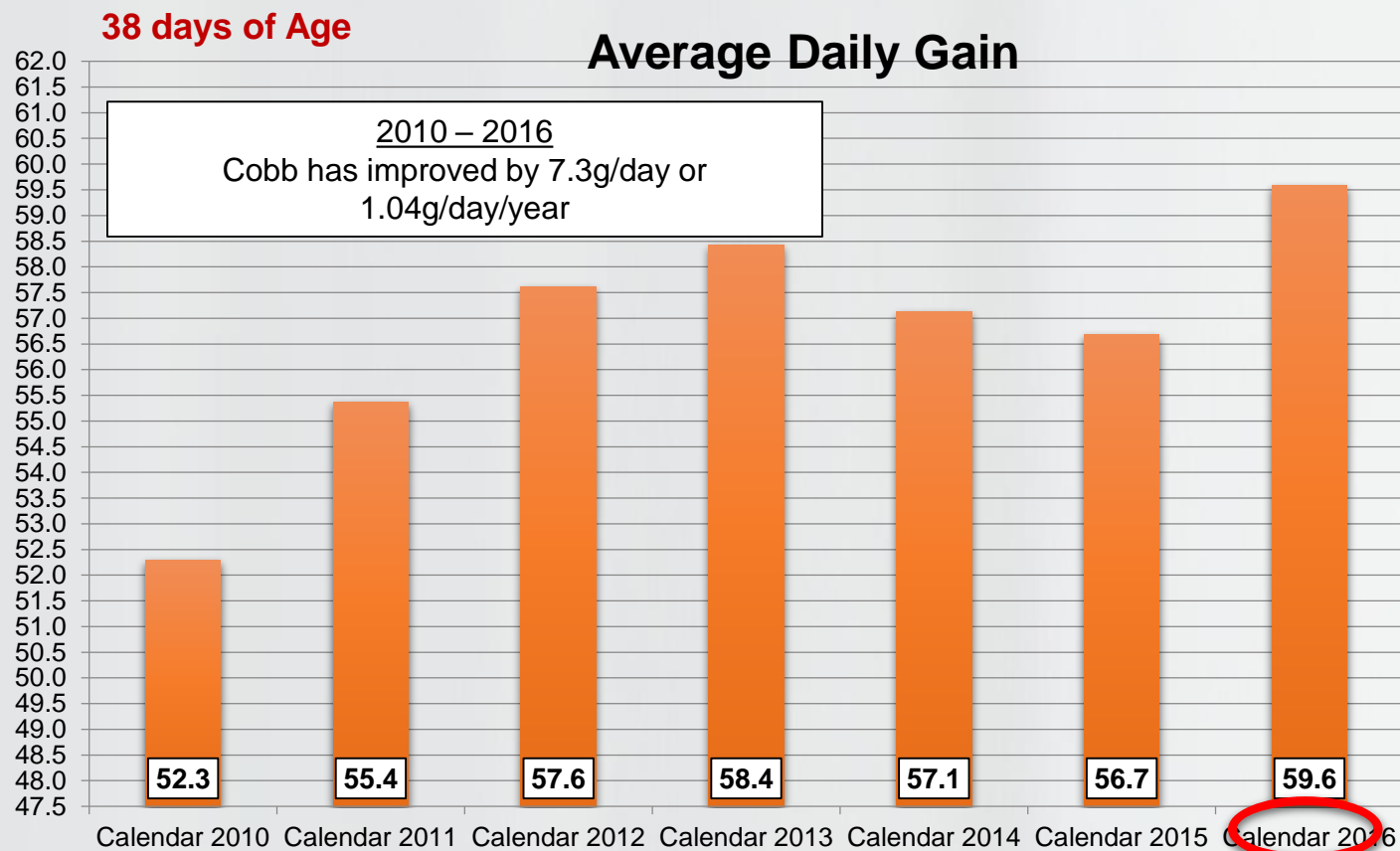
# Broiler Trends – EMEA

38 days of Age, FCR to 2.1kg



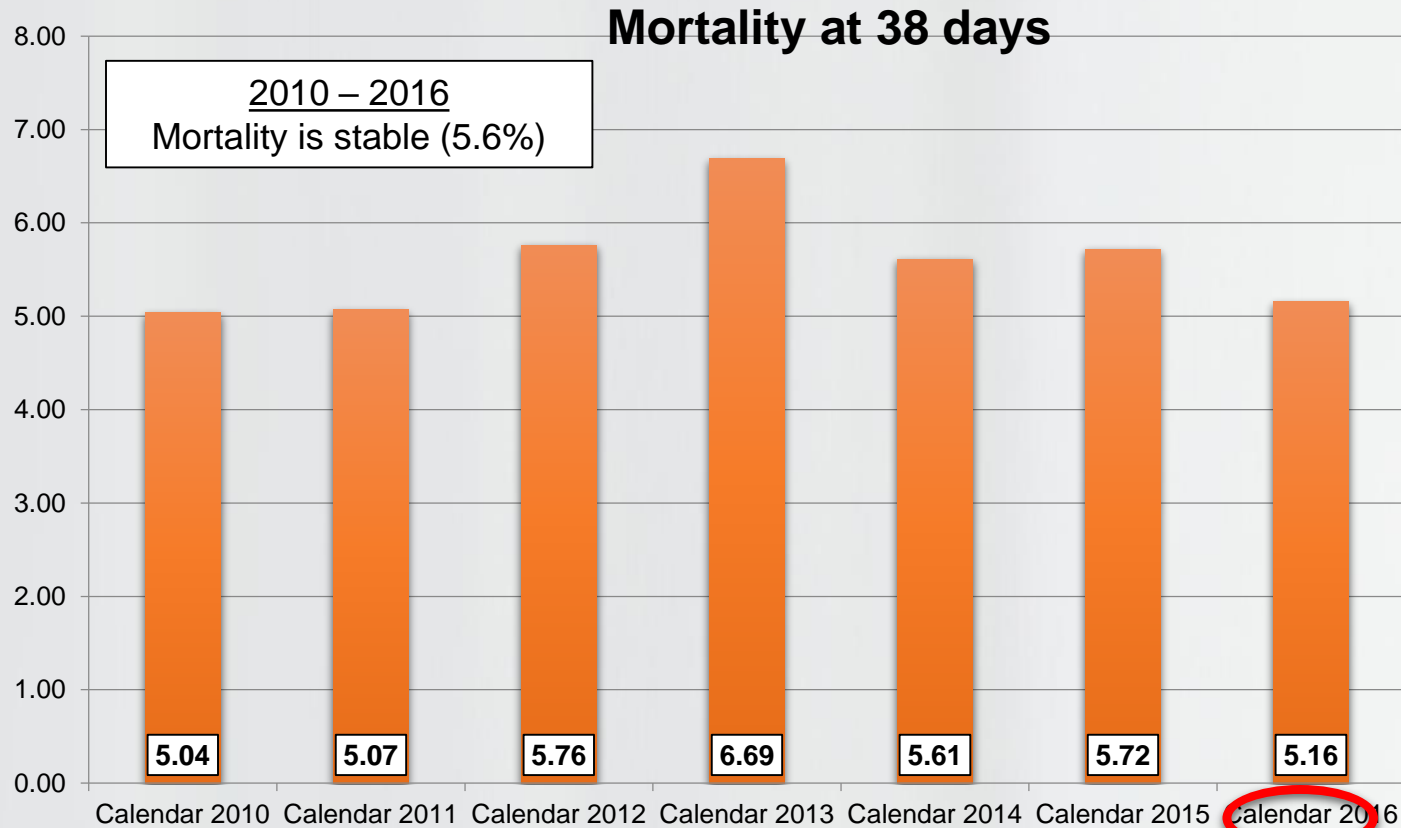
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# Broiler Trends – EMEA



ONE FAMILY.  
ONE PURPOSE.

# Broiler Trends - EMEA



ONE FAMILY.  
ONE PURPOSE.





ONE FAMILY.  
ONE PURPOSE.



# Thank You!

## Any Further Questions?