



Hatchery Talks

Hatchery Ventilation & Climate Control

Before we start ...

- **Polls**
- **Questions**



Contents

- **Introduction**
- **Sufficient air**
- **Good conditions**
- **Correct place**



Hatchery Talks

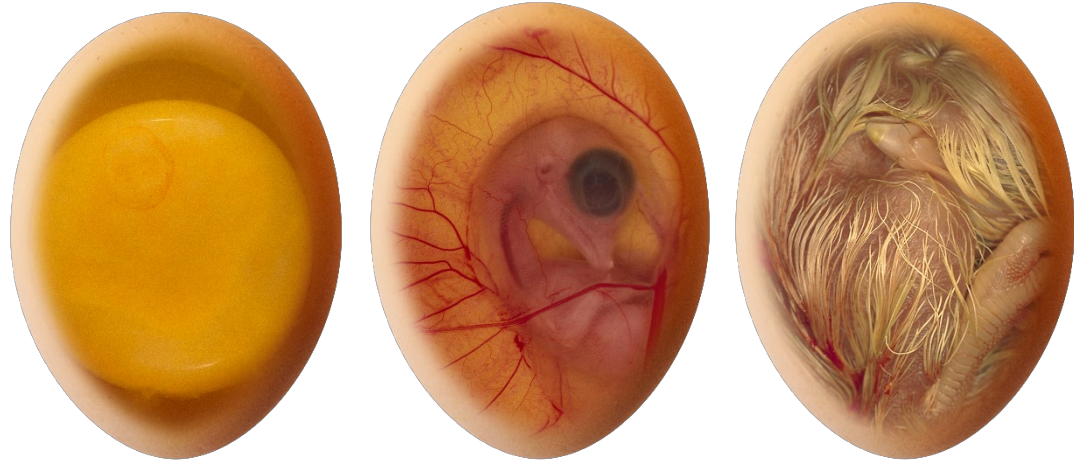
Introduction



Requirements for incubation

5 fundamental requirements

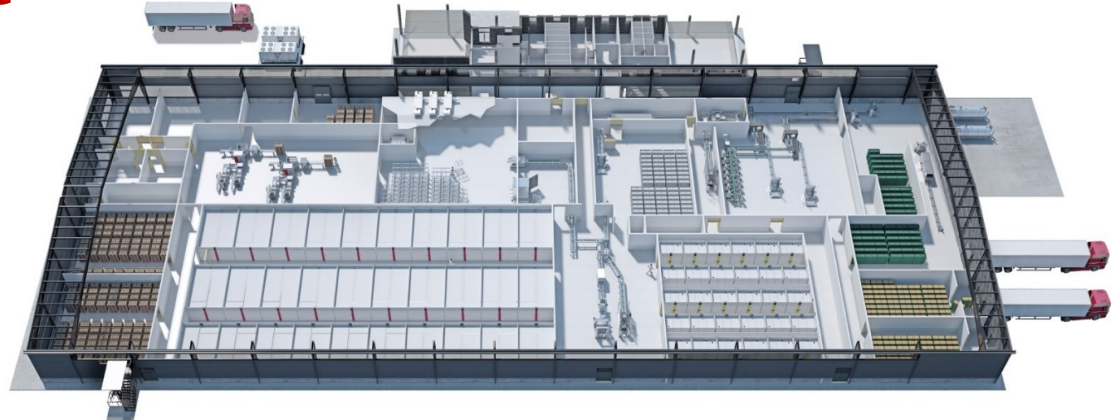
1. Temperature
2. Humidity
3. Turning
4. Oxygen
5. Hygiene



Requirements for incubation

4 linked to Hatchery Ventilation & Climate Control

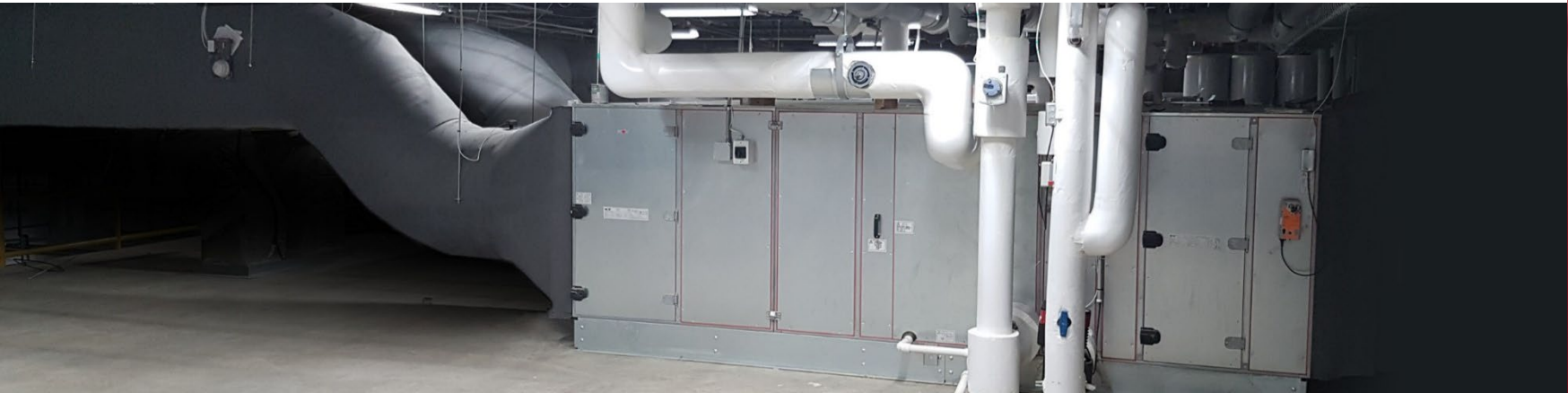
1. **Temperature**
2. **Humidity**
3. Turning
4. **Oxygen**
5. **Hygiene**



What is hatchery ventilation?

Bringing sufficient air of good conditions to the correct place (+ exhaust 'used' air)

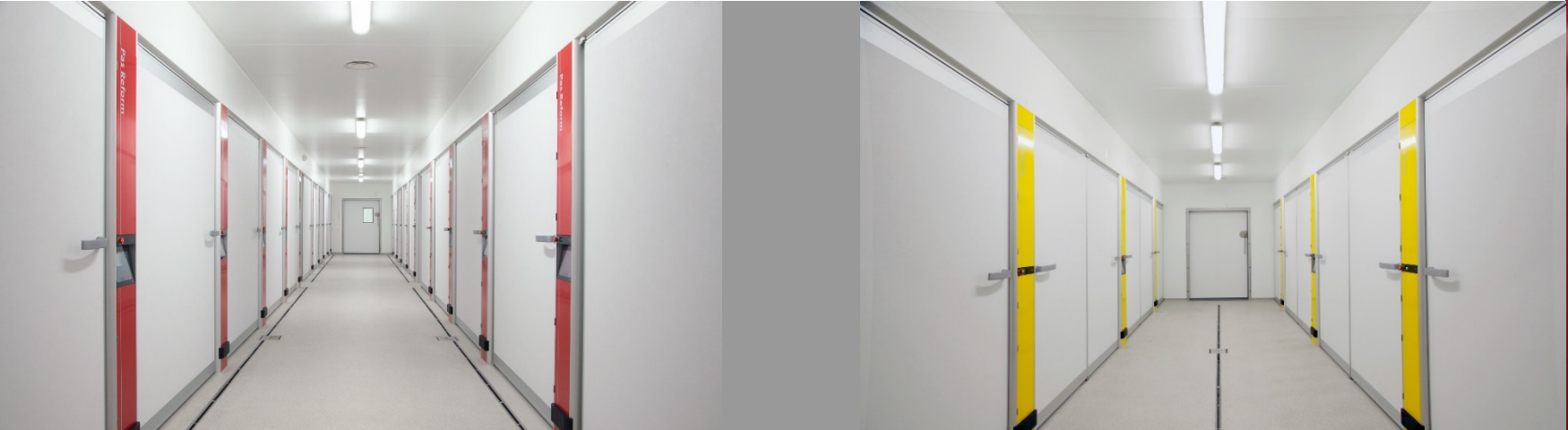
1. Sufficient air
2. Good conditions
3. Correct place



Introduction

Focus on setters & hatchers

For this Hatchery Talks we neglect other rooms in the hatchery like egg storage room and chick despatch room



Hatchery Talks

Sufficient air

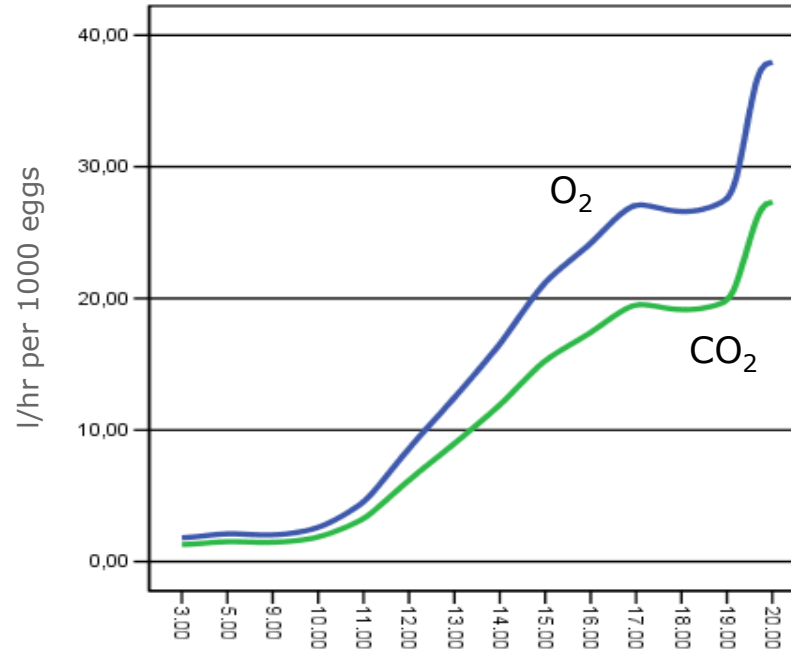


Sufficient air

Ventilation for O₂-supply

O₂ = essential
CO₂ + H₂O =
waste products
from embryo
metabolism

**Exponential
increase
during
incubation**



After Romanoff A.L. 1960: The Avian Embryo



Sufficient air

How much air is needed?

Theoretical calculations based on CO₂

Starting points:

- RQ-value CO₂/O₂ 0.67
- Heat production 18th day 0.15 W/egg
(Nangsuay et al, 2015)
- Fertility 95%

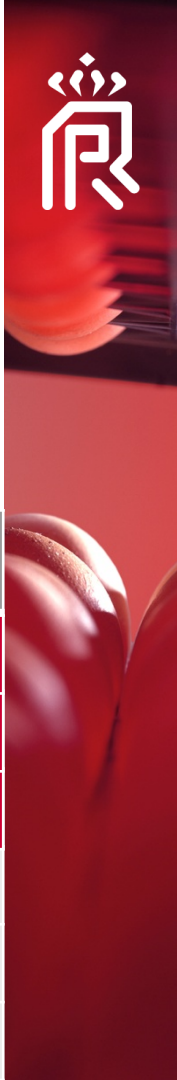


Sufficient air

At day 18 for 124.416 eggs (162/16)

Amount of air depends on set point of CO₂

| Max CO ₂ (ppm) | CO ₂ inlet (ppm) | M ³ /hr/ setter | M ³ /hr/section | M ³ /hr/1000 eggs |
|---------------------------|-----------------------------|----------------------------|----------------------------|------------------------------|
| 4000 | 500 | 625 | 104 | 5.0 |
| 3000 | 500 | 875 | 146 | 7.0 |
| 2500 | 500 | 1094 | 182 | 8.8 |
| 2500 | 700 | 1215 | 203 | 9.8 |
| 2500 | 900 | 1368 | 228 | 11.0 |
| 2000 | 700 | 1683 | 281 | 13.6 |



Sufficient air

At day 18 for 124.416 eggs (162/16)

“Clean air helps!”

| Max CO ₂ (ppm) | CO ₂ inlet (ppm) | M ³ /hr/ setter | M ³ /hr/section | M ³ /hr/1000 eggs |
|---------------------------|-----------------------------|----------------------------|----------------------------|------------------------------|
| 4000 | 500 | 625 | 104 | 5.0 |
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Sufficient air

Calculating capacity AHU

- **At max. ventilation:**
 - Setters: $200 \text{ m}^3/\text{section}/\text{hour}$ = approx. $10 \text{ m}^3/\text{hr}/1000 \text{ eggs}$
 - Hatcher: $450 \text{ m}^3/\text{hatcher}/\text{hour}$ = $22 \text{ m}^3/\text{hr}/1000 \text{ eggs}$
- **Setting schedule**
- **Also for other rooms?**
- **Extra for leakage!**



Hatchery Talks

Good conditions



Good conditions

Climate requirements inlet air setter and hatcher



| Temperature | Humidity | |
|----------------|----------|----------------|
| | RH | Dew point |
| 21 – 27 °C | < 70 % | 11 – 19 °C |
| 69.8 – 80.6 °F | | 51.8 – 66.2 °F |

Good conditions

Climate requirements inlet air setter and hatcher

Optimal set points:

Target:

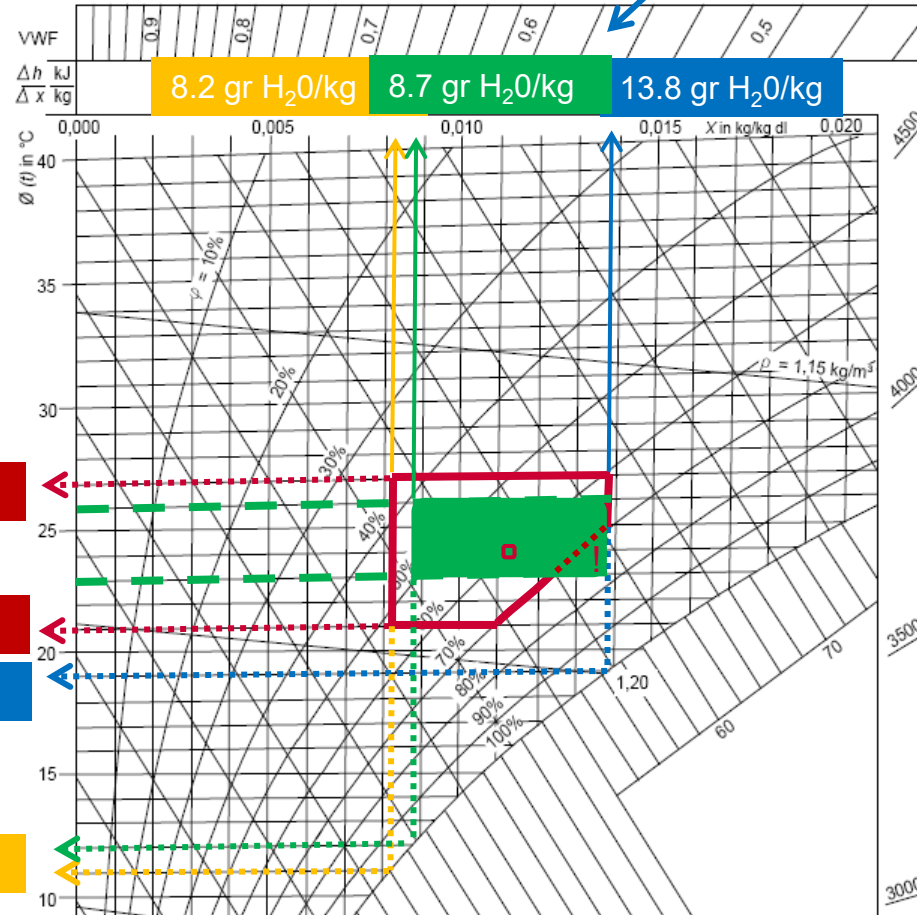
24 °C
60 %RH

Range

23 – 26 °C
12 – 19 °C dew point

27 °C
21 °C
19 °C
11 °C

Absolute humidity



Good conditions

Why these climate boundaries?

- **Too cold:** low uniformity of temperature
- **Too warm:** too much cooling by water
→ condensation
- **Too dry:** cold spot due to active humidifiers
- **Too wet:** low egg weight loss
→ poor chick quality and hatchability
- **RH > 70 %:** risk for fungal development
(Aspergillus)



Good conditions

Does external climate match?



Good conditions

Aspects of external climate

Mainly temperature and humidity:

- Seasonal changes?
- Day – night rythm?
- Average or extremes?
- Location weather station versus location hatchery?
- Altitude?

Remember ... your hatchery is in operation 24/7 – 365 days!



Good conditions

Air Handling Unit

What does it do:

1. Moves air
2. Filters
3. Heats and/or cools
4. De-humidifies
5. (Humidifies) → final step of AHU?



Good conditions

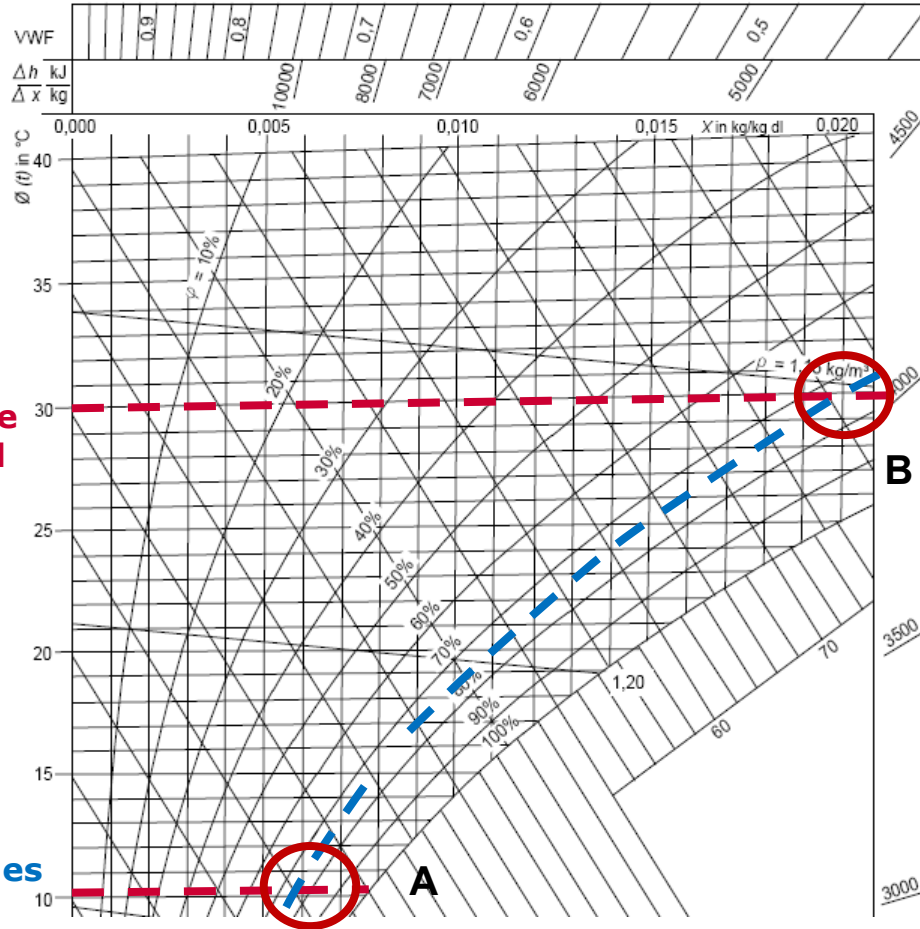
Climate A:
10 °C / 75 %RH

Climate B:
30 °C / 75 %RH

Absolute humidity
= vertical lines

Temperature
= horizontal lines

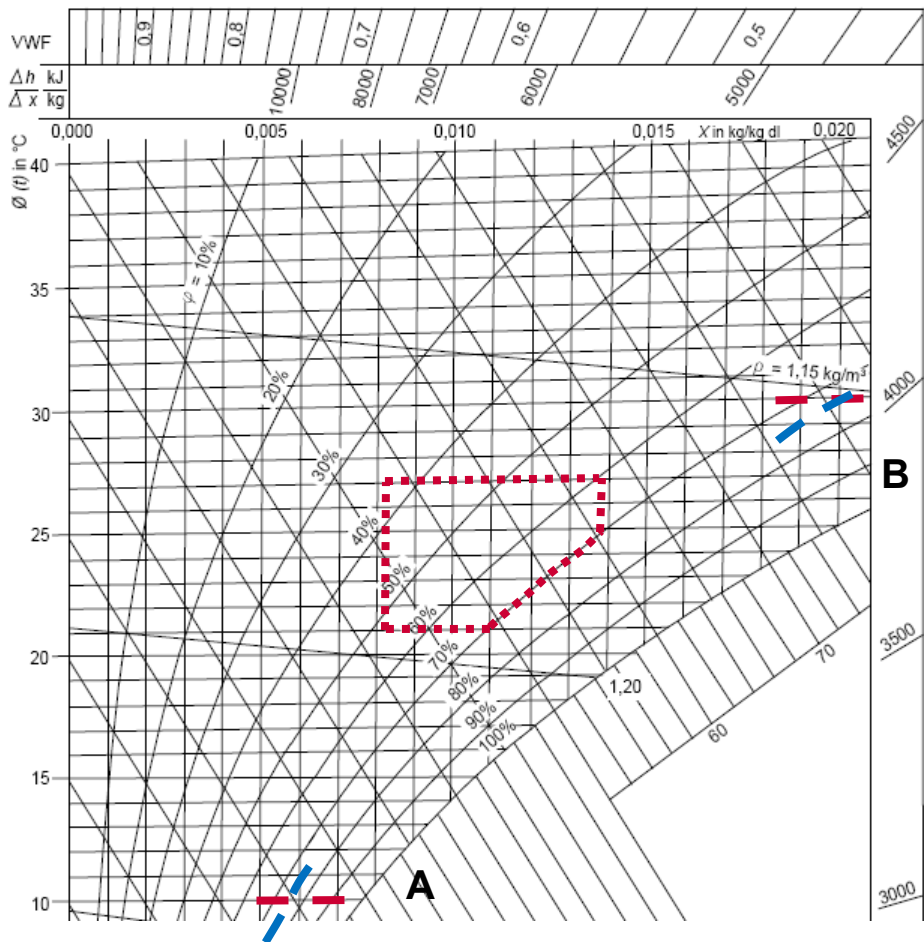
% RH
= curved lines



Good conditions

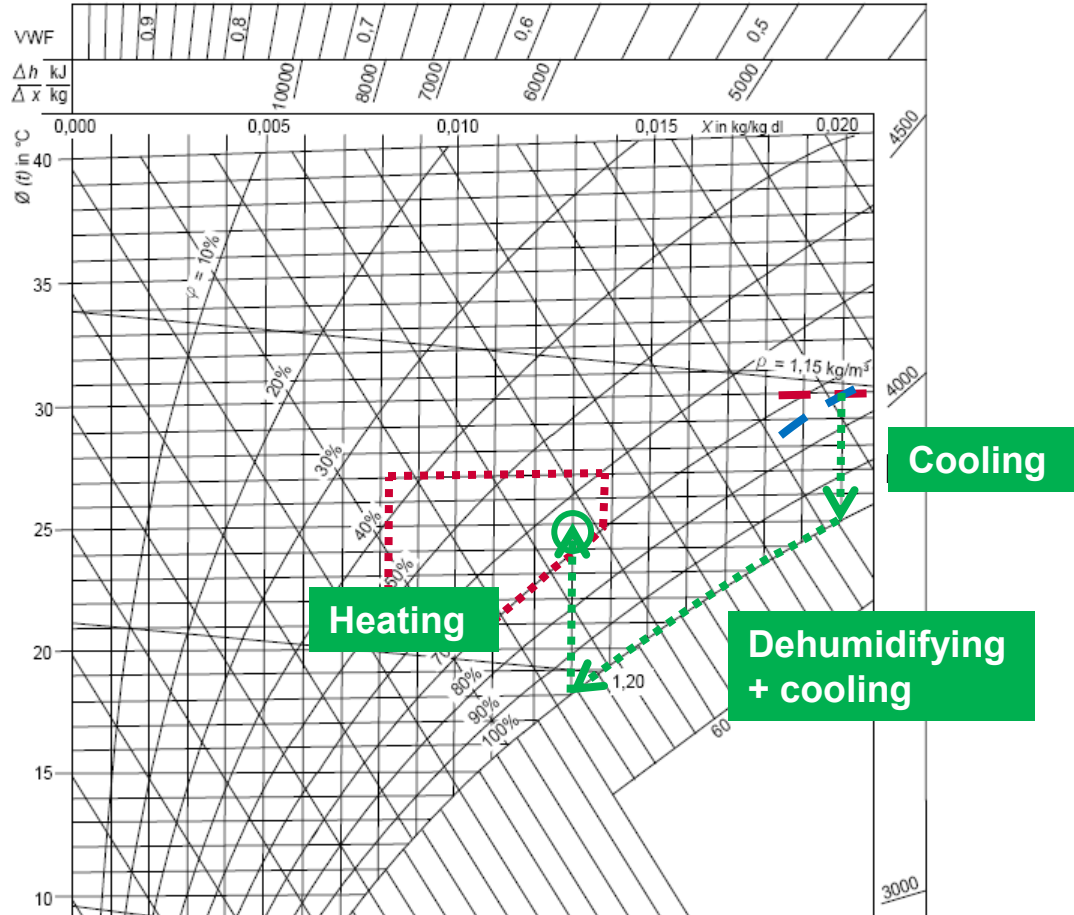
Climate A:
10 °C / 75 %RH

Climate B:
30 °C / 75 %RH



Good conditions

Climate B:
30 °C / 75 %RH

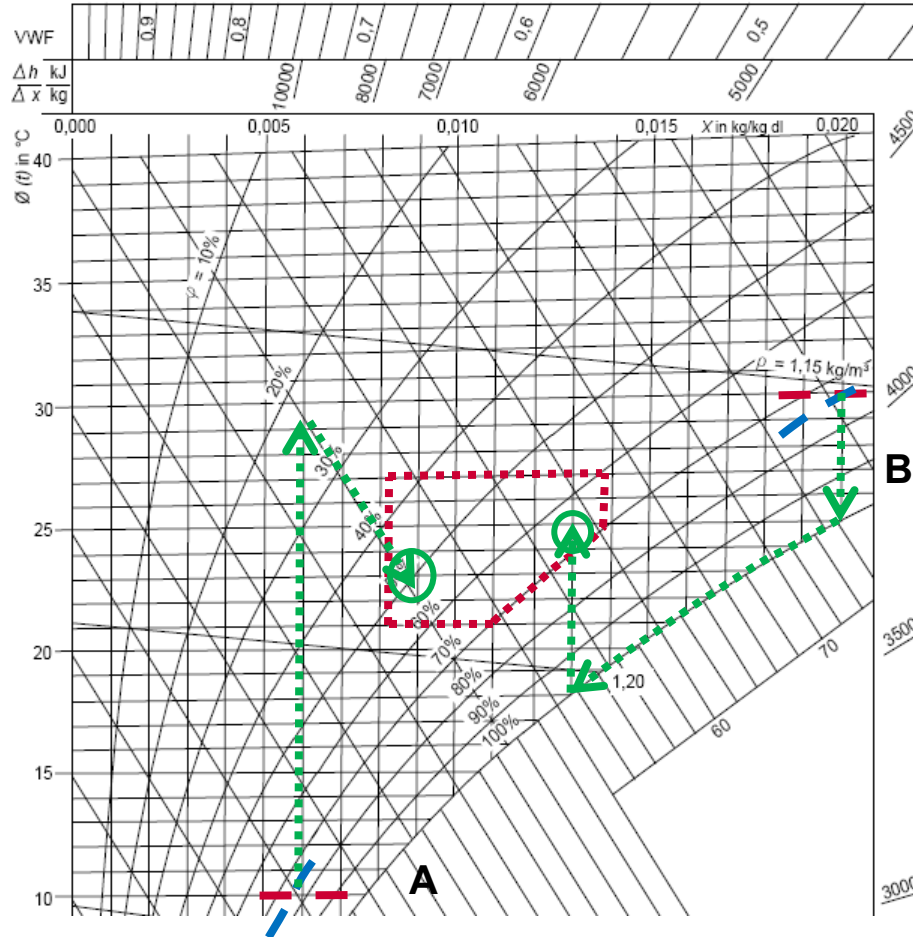


Good conditions

Climate A:
10 °C / 75 %RH

Climate B:
30 °C / 75 %RH

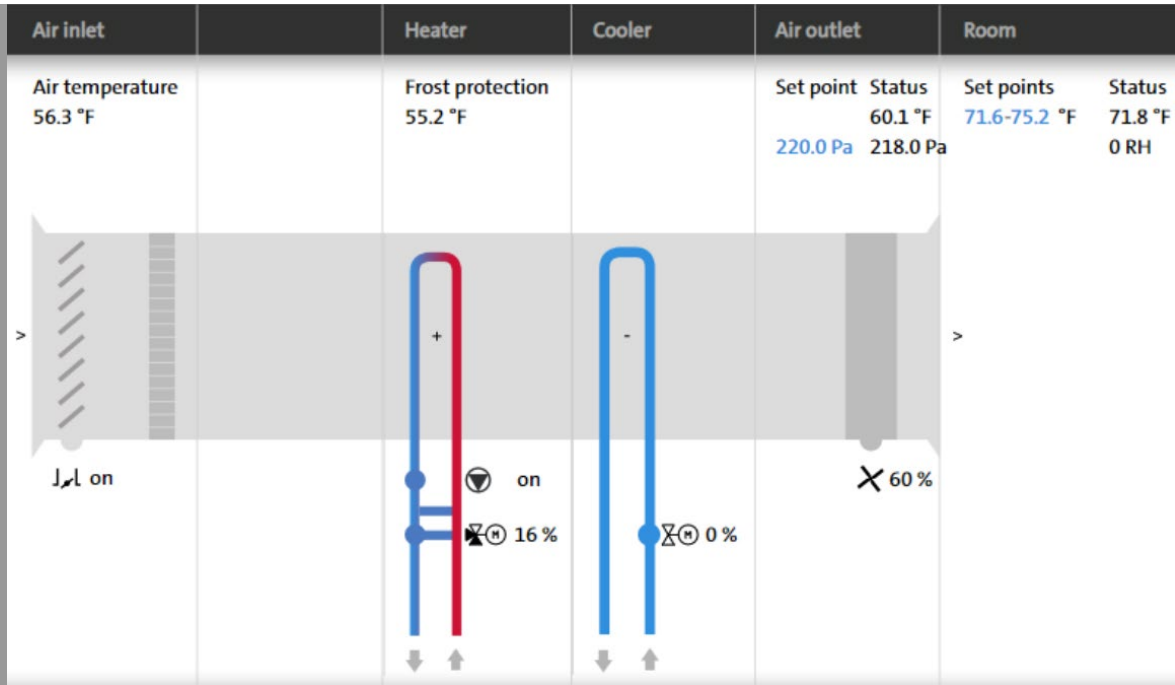
Energy-efficient
choice of set
points AHU



Good conditions

AHU, what does it do?

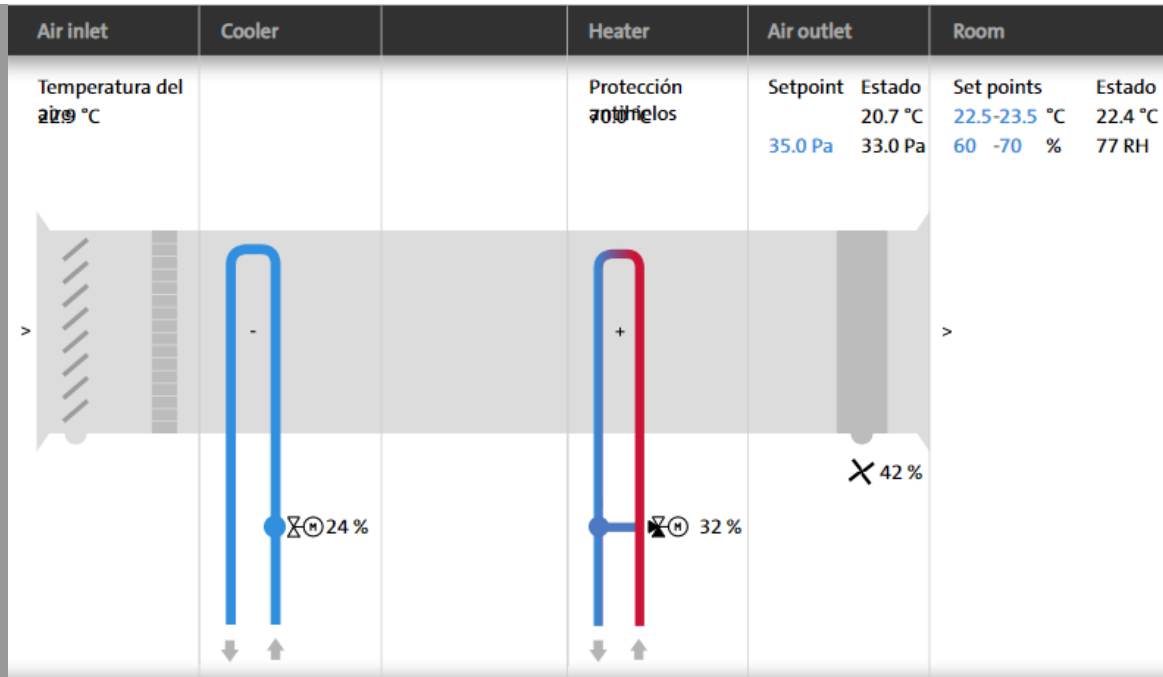
Heating - cooling



Good conditions

AHU, what does it do?

Cooling - heating = dehumidifying



Good conditions

AHU, what does it do?

Heating – cooling - heating

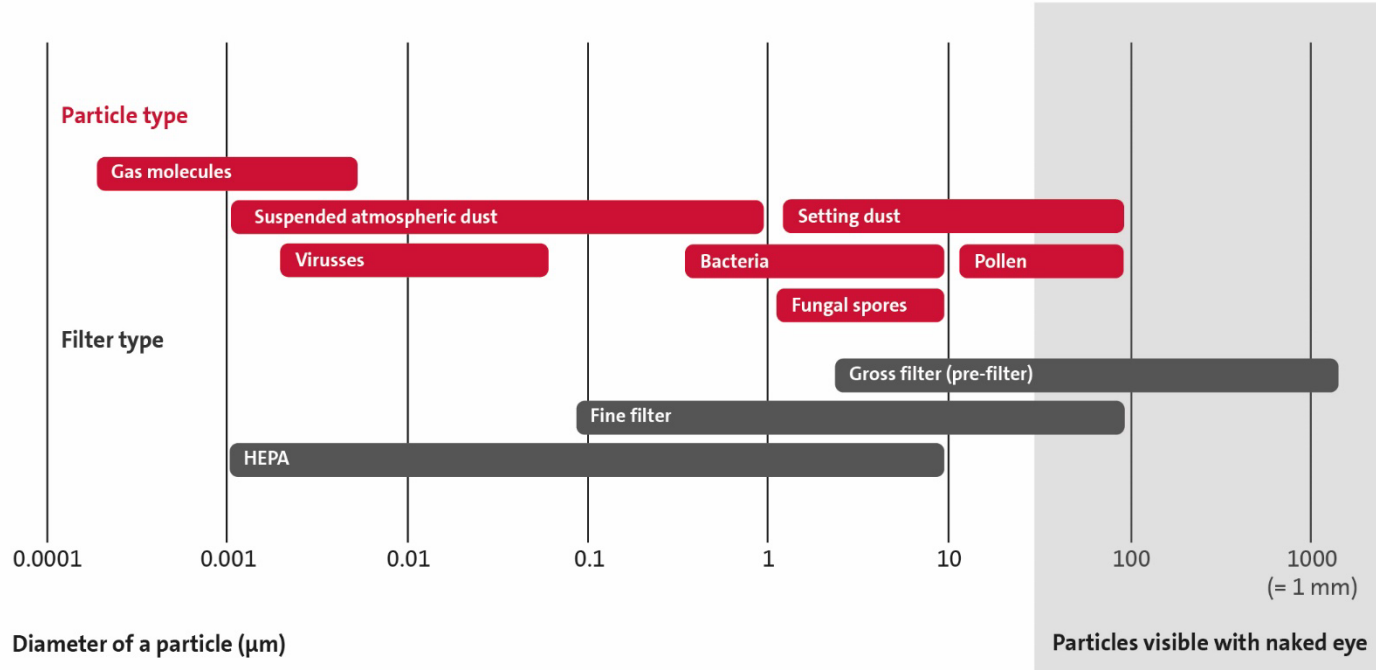


Heat recovery can be used for 1st heating step



Good conditions

Filter and AHU

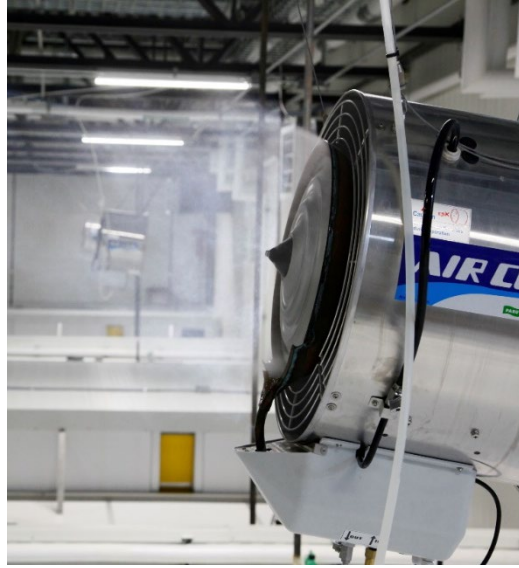


HEPA filter = High Efficiency Particulate Air filter.



Good conditions

Options for humidification



Hatchery Talks

Correct place



Correct place

Transport of air

From Air Handling Unit to:

- Inlet setters / hatchers
- Other rooms like chick handling room

And taking used air out of hatchery:

- Yes/no recirculation? (fungus, CO₂, temp./%RH)
- Energy in exhaust air?



Correct place

Pressure differences

Pressure differences needed for:

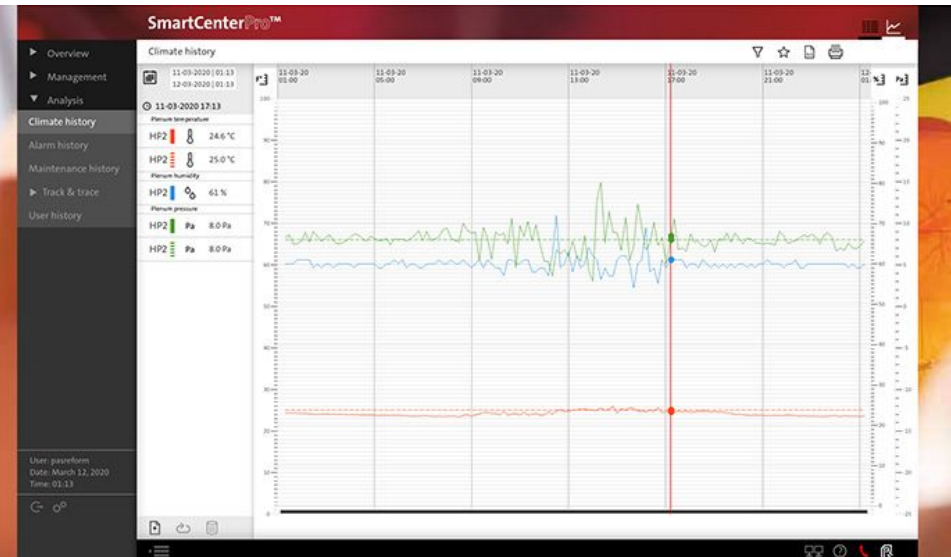
- Hygiene (“clean to dirty”)
- To facilitate setters and hatchers to ‘breath’ well



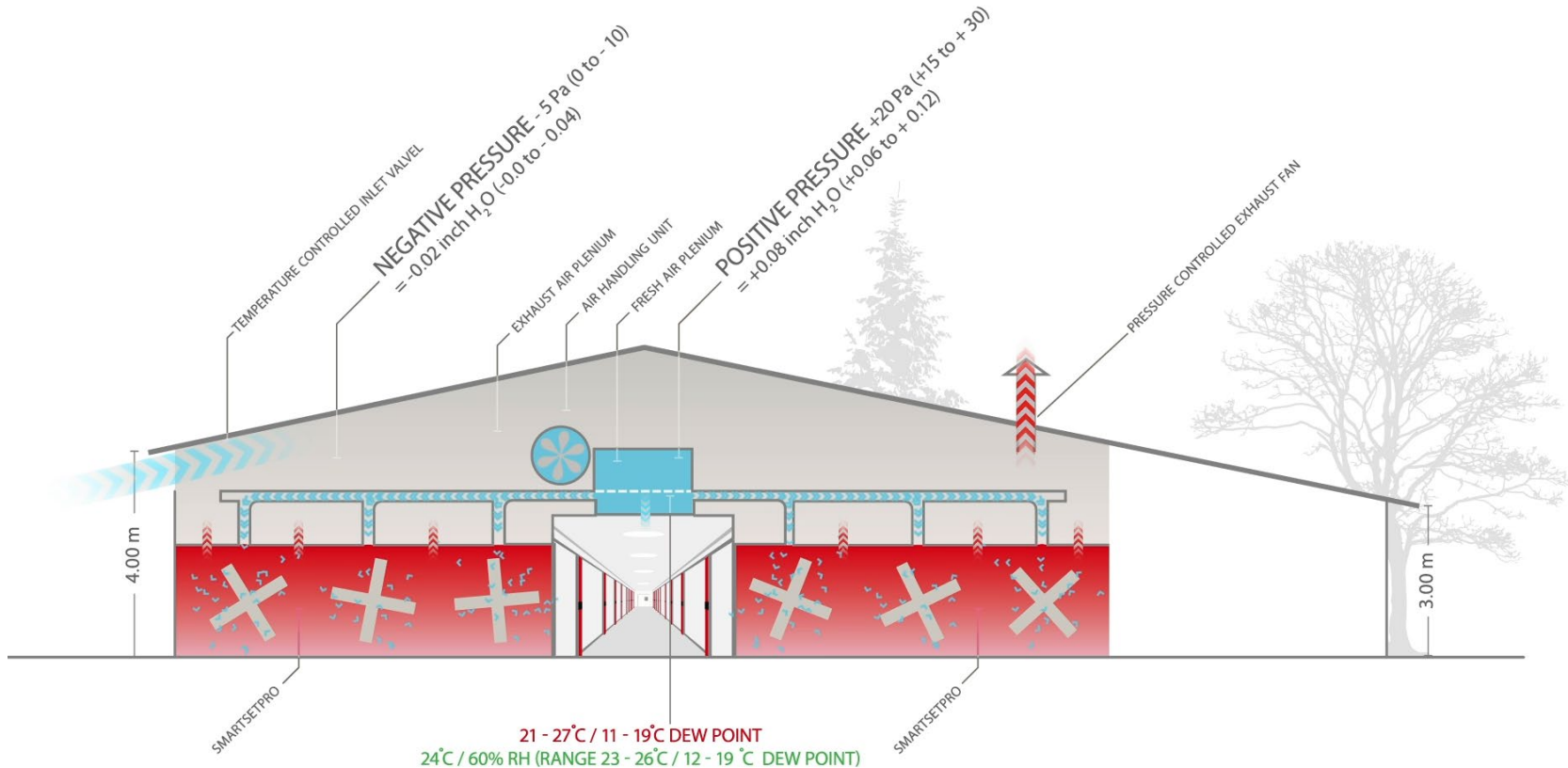
Correct place

Pressure differences

Air pressures needs to be well balanced & controlled!

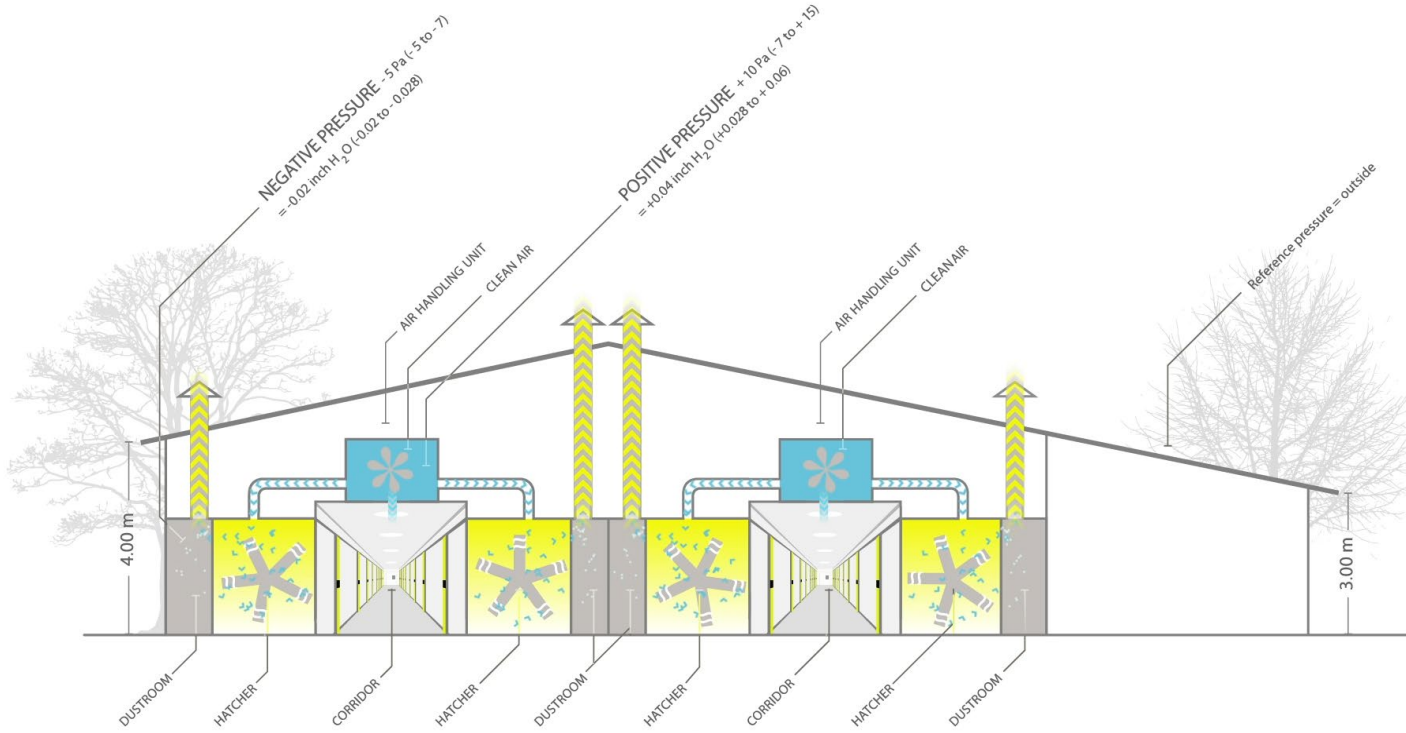


Correct place Setter airflow



Correct place

Hatcher airflow



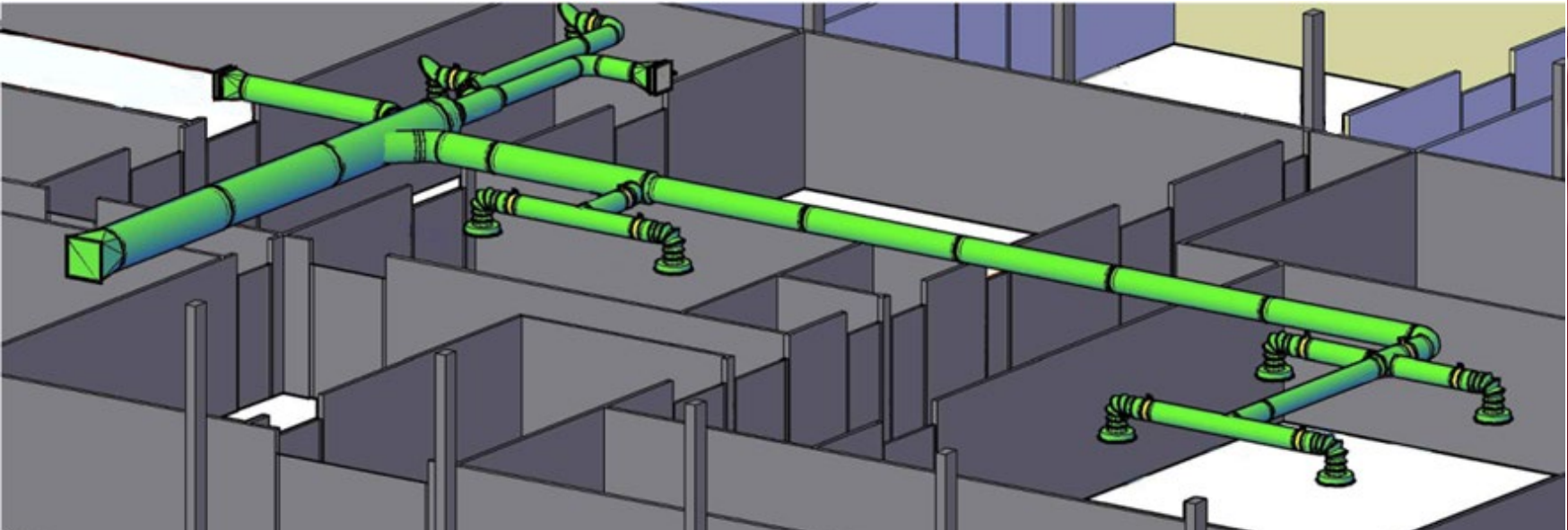
21 - 27°C / 11 - 19°C DEW POINT
24°C / 60% RH (RANGE 23 - 26°C / 12 - 19 °C DEW POINT)



Correct place

Uniformity of air distribution

Clean air transport through piping



Correct place

Uniformity of air distribution

Setters with inlet from corridor



Correct place

Uniformity of air distribution

Setters with 'inlet box' (clean air plenum)



Correct place

Uniformity of air distribution

Taking out used air from setter to attic



Correct place

Uniformity of air distribution

Taking out used air from hatcher to fluff tunnel



Hatchery Talks Summary



What did we discuss?

- Hatchery ventilation is bringing sufficient air of good conditions to the correct place (+ exhaust 'used' air)
- Conditioning air is expensive



Cost-efficient hatchery ventilation

- Choose optimal set point for AHU
- Do not waste 'expensive air':
 - Keep doors closed
 - Replace bad door seals
 - Do not over-ventilate setters and hatcher



Summary

**Let's close the door ...
and save money!**



Thanks for watching!

- **Webinar-replay + hand-out**
- **Knowledge section at our website**

See you at our next webinar

