

Humidity and Dehydration at Hatching Time



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Let's start reviewing the Four Pillars of Incubation

1. TEMPERATURE.



- Requiring heat at the beginning of incubation and releasing at the end.

2. HUMIDITY.



- Related to egg moisture loss.

3. VENTILATION.

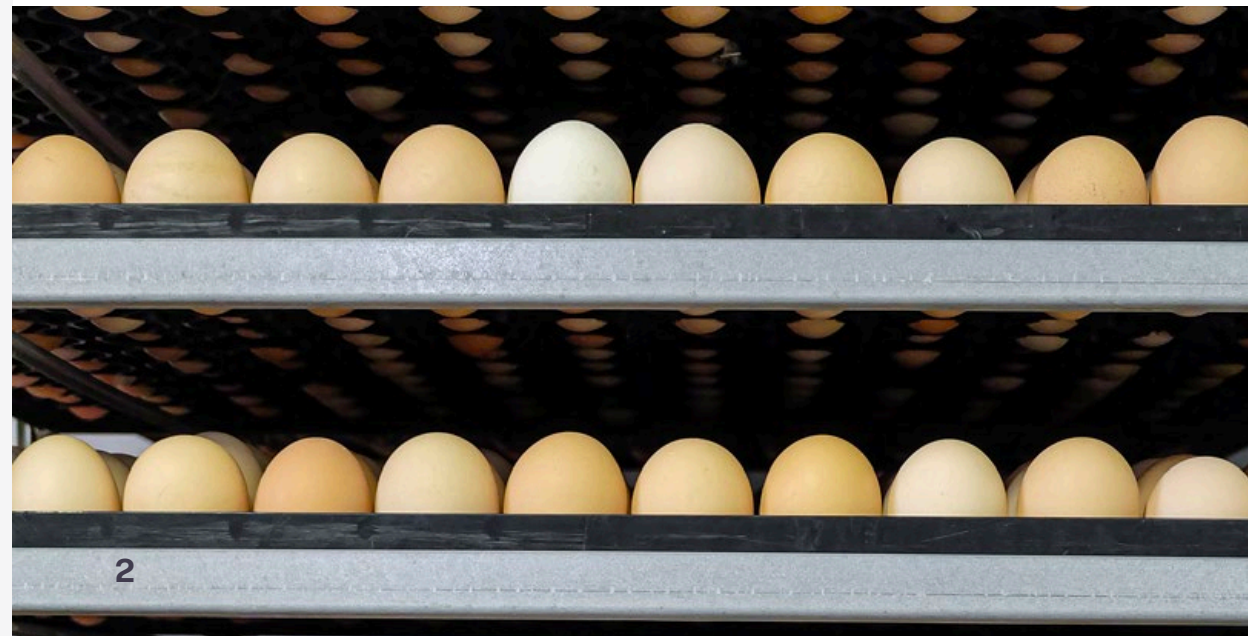


- To provide oxygen, remove CO₂, H₂O, and move heat.

4. TURN.



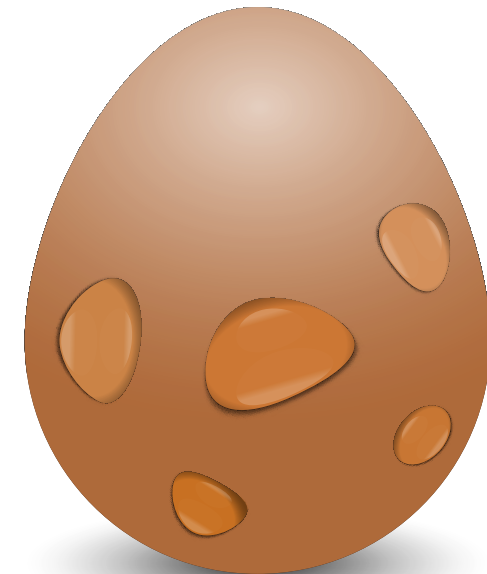
- It is essential during the first 7 days of incubation, prevents embryo from sticking to shell membranes.



Humidity is moisture in the air that can be measured as:

- ▶ **Absolute humidity.** Amount of water vapor in the air expressed as grain/m³.
- ▶ **Relative humidity.** Percentage of the amount of moisture the air could possibly hold. The higher the temperature the higher the capacity of the air to hold moisture.
- ▶ **Dew Point.** When moisture is condensed from the air because it is over the capacity of the air to hold moisture.
- ▶ **Wet bulb temperature.** Indicator of heat content.

- ▶ **Dry bulb temperature.**
- ▶ **The Psycho chart** (Psychrometric chart). Horizontal lines are constant humidity in the air. Vertical lines are constant dry-bulb temperature. Wet bulb line are the diagonal lines. The relative humidity are the curved lines. The ratio or grains of moisture are on the X-axis. Dew-point lines are thin horizontal lines.



A setter hall with 80 °F and 50% Relative Humidity. The egg setter should be higher than 60 oF to prevent condensation.

Pre-warming eggs in the setter all at 80 °F and 60% RH. The temperature needed in the storeroom should be 65 °F to avoid condensation on eggs.

For every 20 °F degree rise in temperature you double the water holding capacity of the air. Then, at 60 °F and 60% RH, the air temperature should raise to 80 °F to make the the RH drop to 30%.

Summer conditions the air coming to setter hall will be at 95 °F and 60% RH. If we cool the room, air to 78 °F the RH% is at 100%. In that case, it is necessary to dehumidify.



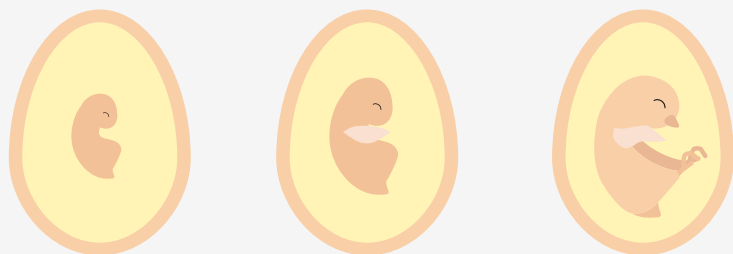
The optimum room humidities vary depending on the process and they should be 60-65% in egg room, 50 to 55% for multistage incubator room, 35-45% for single-stage incubator room, 50-55% for hatcher, transfer, process, and chick rooms.

Humidity and temperature, along with the damper opening, controls moisture loss. In multi-stage machines the humidity are also part of the cooling system. In single-stage machines have high humidity during the first week and later lower at the end of the cycle.

Moisture loss is necessary to form the air space sufficient to enable pulmonary and respiration. Less than 6.5% and more than 17-18% of moisture loss are negative for embryo development.

Moisture loss at 18 days should be 9 to 11 % in single-stage machines and in multi-stage between 11 and 13%. If the embryo is developing normally, the air cell occupy about one-third of the space inside the egg at 18 days of incubation.

Eggshell contains pores from which water vapor is lost from the egg during incubation.



Moisture loss or egg weight loss are related to chick hatching internal/external pipping, air sac pulmonary respiration, navel healing, and optimum chick yield and quality.



Relative humidity of Hatcher can have different impacts depending on the Hatch window.

Big hatch windows can cause chick dehydration. Too late hatch window can cause some unhealed navels.



Incubation process

- ▶ **Endothermic process.** Humidity increases by closing dampers and passive evaporation from the eggs themselves.
- ▶ **Neutral phase.** In single stage the dampers start opening and moisture egg loss increases
- ▶ **Exothermic phase.** Need to continue decreasing humidity so that the proper moisture loss is achieved.



Important verify maintenance, notes, and calibrations to determine how to make settings on the machines.



How to measure egg weight loss

- ▶ Fill the setter trays and remove cracked eggs and only use eggs without defects.
- ▶ Weight full setter trays, record weight and number of eggs on tray
- ▶ Identify trays and place on the top, middle and bottom of the incubator rack.
- ▶ Don't remove any clear and non-viable eggs.
- ▶ At transfer, reweight the trays selected and calculate moisture loss.





If eggs are incubated too dry, the following abnormalities will occur:

- ▶ Large air cell
- ▶ Poor hatchability with weak chicks
- ▶ Residual yolk dry and thickened
- ▶ Small, weak, pale chicks
- ▶ High chick mortality during the first days of life
- ▶ Reduced hatchability from pipped eggs (down stuck to the shell and excessively tough membranes).



If the eggs are incubated with high moisture conditions, 8 to 10% of the chicks may have the following abnormalities:

- ▶ Poor hatchability, weak chicks with sticky beaks
- ▶ Analysis of non-pipped eggs shows many full-grown, wet chickens with a lot of moisture
- ▶ Small chicks with a large, distended belly
- ▶ Many cases of poorly sealed navels.
- ▶ Sticky down, egg content and down
- ▶ Red hocks.



Thank you!

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