EGG STORE

Controlling egg water loss during storage

The influence of air temperature and relative humidity

To enable their function as incubation vessels, all eggs are enclosed in a porous outer container – the egg shell. The shell must allow gases through so that the developing respiring embryo is able to get rid of carbon dioxide and take in oxygen.

Water also passes through the pores in the egg shell, even when embryo development is paused during egg storage. Egg water loss during storage can be assessed by measuring the egg weight at the start and end and calculating the weight loss. Eggs kept in reasonable conditions will commonly lose about 0.5% of their initial weight after a week in storage, which does not seem to harm hatch or chick quality. Although the number and diameter of pores in an individual egg are fixed, it is possible to affect the rate of water loss by adjusting the conditions in which the eggs are held.

This is because the rate of water loss will be governed by the difference in water vapor pressure inside and immediately outside the egg – the water pressure deficit. Relative humidity inside the egg will remain at 100% at all times, because the egg has a high water content. External conditions will not affect humidity inside the egg. However, the water vapor pressure differential can be changed, because the water vapor pressure of the air in the egg store alters as a function of temperature and relative humidity.

Humid air will have most of the available space already occupied by water molecules, and the vapor pressure will be high.

If the air is cooled then it can hold less moisture, so the humidity and water vapor pressure both rise.

Eventually the dew point is reached and water vapor will condense out of the air.

We tend to try to control water loss of stored eggs by keeping humidity and water vapor pressure in the egg store up.

However, this can encourage bacterial or fungal contamination of the eggs, either through using contaminated water to fog or wet the egg store, or through condensation on the egg surface.

An alternative way to reduce the water pressure deficit is to lower the air temperature in the store. Table 1 shows that the impact on the water vapor deficit is the same when humidity is raised by 5%, or temperature reduced by 3 C.

	Common conditions	Increase relative humidity	Decrease temperature
Inside	18 C, 100% = 20.6 mbar	18 C, 100% = 20.6 mbar	15 C, 100% = 17.0 mbar
Egg storage room	18 C, 70% = 14.4 mbar	18 C, 75% = 15.5 mbar	15 C, 70% = 11.9 mbar
Water vapor deficit	+6.2mbar	+5.1 mbar	+5.1 mbar

Table 1 *The impact on the water vapor deficit when humidity is raised by 5%, or temperature reduced by 3 ˚C.*

Based on calculated values of water vapor deficit, the figures demonstrate that reducing the egg store temperature from 18 C to 15 C (64.4-59 F) will be as effective as increasing its relative humidity by 5%. In conclusion, a lower storage temperature could help to keep weight loss during egg storage under control without increasing the risk of contamination.