

Eggs do not like water

By Ron Meijerhof

One of the biggest risks for our incubation process is contamination with bacteria. Bacterial contamination results in more bangers, poor hatchability and poor chick quality. Of course the prevention of bacterial contamination starts in the laying nests, by producing clean eggs. But as an egg will never be sterile, it is important to prevent bacterial growth later on as well. Condensation (sweating) of eggs is one of the conditions that will stimulate bacterial growth, as bacteria grow well in a wet environment.

Condensation is a matter of temperature differences and relative humidity. Air of a certain temperature can only hold a certain amount of moisture. If there is more moisture in the air than the air can hold, it will form droplets as the maximum amount of moisture is reached. Warm air can hold much more moisture than cold air. Air of 25°C can hold at maximum 23 g of water per m³, where air of 20 °C can only hold 17g. If air has a relative humidity of 100%, the air is completely saturated with water, it cannot hold more water. If the air holds only half of the maximum amount of water, it has a relative humidity of 50%. So relative humidity is exactly that, relative. It reflects the amount of water in the air as a percentage of the maximum amount that that air can hold.

But that means that if we have warm air with a high relative humidity, and we cool down that air or we bring in objects that are cold, the air will not be able to hold all the water anymore. And as a result, we see the condensation occurring. The temperature at which the air cannot hold all the water anymore is called the dew point. It is the minimum temperature at which condensation will just take place.

What happens if we bring in cold eggs in a warm environment? The surface of the eggs might be colder than the actual dew point in that room, and if that is the case condensation (sweating) will occur. This condensation will show on the eggs, but as long as we don't touch the egg is not always very visible. However, its very easy to detect by putting your hand on the eggs. If the eggs feel dry, there is no condensation, but if the eggs are too cold they often feel a bit "sticky", which is the first step of condensation, even before we see actual droplets on the eggs forming. Also the "glance" of the egg shell is an indication for condensation.

Some people think that with air movement over the eggs, we can reduce the negative effects of condensation, as the shells are "dried" by the air. Indeed, with air movement the shell tends to show more dry, but the real risk of condensation is actually happening in the pores of the egg shell. As in the pores there is no air movement, only temperature and relative humidity are determining condensation at that spot. And as bacterial growth in the pores is the biggest threat for the embryo, air movement to remove condensation has limited value.

The dew point of air (the egg shell temperature at which they will start to sweat) is dependent on the temperature of the air, but also on the relative humidity. High relative humidity will cause sweating at a much higher temperature than low relative humidity. The dew point of air of 25°C and 50% RH is 14 °C (eggs will sweat in this air when their temperature is lower than 14°C), but the dew point of air of 25°C and 80% RH is 21°C. To prevent sweating, it is therefore important to not allow the relative

humidity to go up too much, especially if the temperature control of eggs and storage room is not optimal.

We often see that a lot of water is used or brought into the storage or setting room. Sometimes farm trolleys are cleaned or left to dry in the same area, sometimes a lot of water is used to clean the floors, but also the doors between the storage room and other rooms are often kept open. This is practical, as we need to transport the eggs continuously from the farm to the storage room and from the storage room to the setting room and setters, but we often see that doors to washing rooms are kept open as well. This will increase the relative humidity in the storage room and with that increase the risk of condensation. Especially if the temperature control between storage rooms at different farms, trucks and hatchery is not optimal, this will increase the risk of problems with bacterial contamination, hatchability and chick quality.