MAINTENANCE

Be careful when you change to different fans in an incubator

One fundamental factor for hatching good quality chicks is having the correct eggshell temperature (EST) throughout incubation.

The incubator is set up to control air temperature, which is not the same as EST. Two factors make the two temperatures diverge –the heat production of the embryos as they grow and develop, and the ability of the air moving through the machine to take up and remove surplus heat. Embryo heat production increases rapidly after 10 days of incubation and then plateaus briefly at 17-18 days of incubation at around 138mW/egg. Air movement within the setter plays an important role in removing surplus heat from around the eggs, its effectiveness driven mostly by air speed between the setter trays.

In reality, air speed varies within the setter. Eggs located in a position with low air speed, will have higher eggshell temperature in the last week of incubation than eggs located where air speed is higher. It can be a big challenge to achieve even air speed (and hence eggshell temperature) in the setters in many hatcheries.

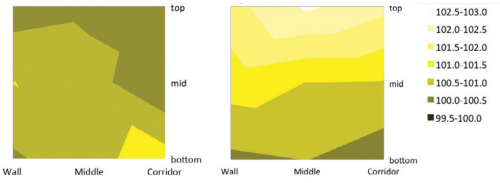
A possible way to get more uniform air speed in the setter could be by replacing existing fans with stronger ones or simply by speeding up the existing fans. Average air speed in the setter will be increased by either modification. But in making the change to the fan speed, air speed within the incubator may become even less uniform.

In a European hatchery with fixed-rack multi-stage incubators, the manager was not satisfied with eggshell temperature and its uniformity. She thought that the original propeller fans were not strong enough to deliver the air all the way down to the floor.

In trial machines, the fans were replaced with stronger axial fans. To everyone's surprise, they saw no improvements in chick quality and hatchability. In fact, the stronger fans made things worse: the machine became too cold at floor level and too hot higher up. During the experiment, air speed in the two trial setters was measured with a hot-wire anemometer and eggshell temperature was measured with Tiny Tag temperature loggers. The new fans increased air speed by an average of 0.5m/s. However, the average EST increased, with the hottest area moving from the bottom of the machine to the top.

The EST area plots show that despite the higher air speed, the average EST was higher, with more eggs falling into the band above 102F which is where problems of quality may be expected to start. In a setter, air doesn't always take the route we expect. Setting pattern, egg size and even turning angle can affect airflow – air always goes by the easiest route where there are fewer or no obstacles. On the other hand, resistance increases as air speed goes up and this relationship is not linear. So, the airflow pattern in the setter can be very tricky. When we try to change ventilation inside of the setter, we should always evaluate the change by checking how actual eggshell temperature changes. Information about how to measure eggshell temperatures can be found in ***Aviagen Hatchery How To No. 6***.

Day-17 EST Distribution in the Setter



Original fans ***New fans***