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Hatchery TIPS 01

DID YOU KNOW THAT IF CHICKS ARE HELD TOO LONG AT HIGH TEMPERATURES, IT CAN AFFECT THEIR GROWTH?

The newly hatched chick can not control its body temperature very well.

Air temperature, humidity, and air speed interact and will all have an effect on the body temperature and the comfort of the young chick.

Fig. 1. Chicks that are too hot.

It is easy to see if chicks are uncomfortable from their behaviour – chicks that are too hot are noisy and pant (as shown in Fig. 1) in order to lose heat.

Chicks that are cold will huddle together to keep warm (see Fig. 2) and their legs will feel cold.

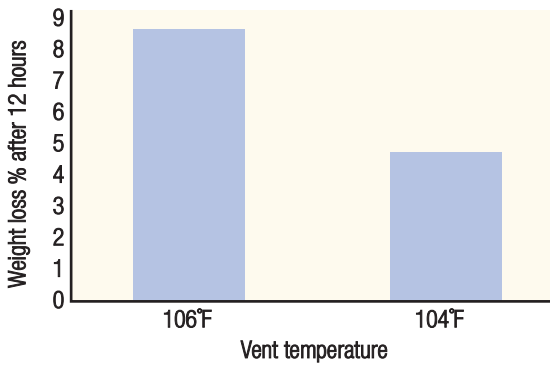
Fig. 2. Chicks that are cold.

In a recent trial, the Aviagen Hatchery Specialist team showed that chicks that were panting had a high vent temperature (averaging 106˚F), while comfortable chicks had a vent temperature that averaged 104˚F.

When the two groups were held in the hatchery for 12 hours, the over-heated chicks lost nearly twice as much weight.

Samples taken at the hatchery showed that chicks that had been overheated had slight gut damage, so they could not absorb nutrients as well.

Grown on in a broiler trial, these chicks were 60g lighter at 35 days than chicks that had been held in comfortable conditions.



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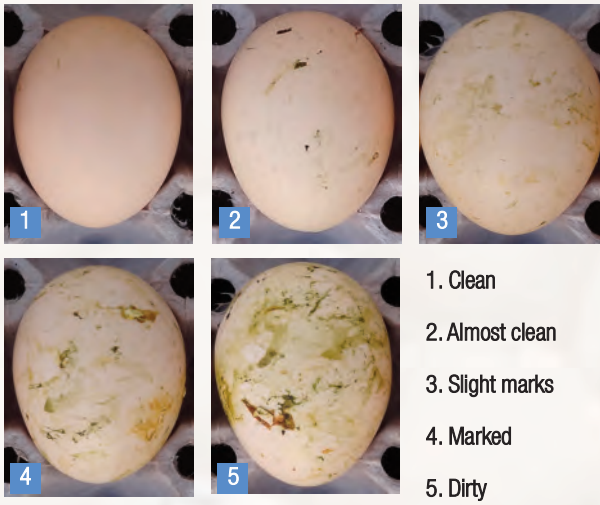
Hatchery TIPS 02

WHAT IS YOUR MECONIUM SCORE?

If chicks are held in the hatcher for too long, they do not grow as well in the broiler house. A good way to tell if this is happening is to check how many of the eggs in a hatcher basket are stained with meconium (the dark green first droppings of the chick).

To find out what your meconium score is, pick out the 5 dirtiest eggs from each of 5 hatcher trays per flock. Select the eggs immediately after the chicks are removed from the hatcher. Score the eggs against the 5-point scale shown below.



1. Clean
2. Almost clean
3. Slight marks
4. Marked
5. Dirty

If the dirtiest eggs are in groups 4 or 5, then the chicks are being left in the hatcher for too long. Delay the next set by 3 hours and make a note to check again when these eggs hatch in 3 weeks time. When you check them, if there are still eggs in groups 4 or 5 you will need to delay the next set by a further 3 hours.

If all the eggs are clean, check that your total incubation time is not too short – this would be indicated by wet chicks in each hatcher basket and, if very short, live pipped embryos.

If your meconium scores vary from tray to tray, setter temperatures may be variable. Use the meconium scores to adjust setting times so that clean eggs predominate on every tray.

Remember to check every hatch – flock age, egg age, and season can all affect the total incubation time.

Incubation time too long	Incubation time too short
5 or more dirty eggs per tray	Clean egg shells in hatch debris
All chicks dry at time of chick take-off	Some chicks still wet
	Live pipped embryos

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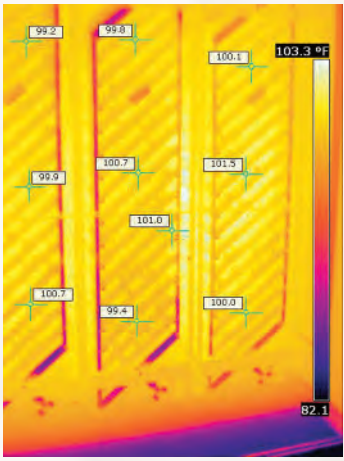
Hatchery TIPS 03

LET YOUR EGGS GUIDE YOU

When you set up your incubator, did you know that your eggs can give you the best guidance on whether the incubator temperature settings are correct?

Incubator temperature sensors measure air temperature at various places in the machine. For practical reasons sensors have to be sited somewhere they do not get in the way of loading or cleaning. Because of this, they may not always reflect the air temperature that is experienced by the eggs.



Provided that everything is correctly set up, and the machine is well maintained, then the air temperature is a good indicator that the embryo temperatures are correct as well. But if not, the machine temperature may not predict embryo temperature as accurately as you would like it to.

Once the setter has stabilised, it is wise to calibrate the machine sensors. This should be done using an accurate, certified calibration thermometer, every time the machine is loaded (single stage) or monthly (multi stage). But this only tells you whether the air temperature recorded by the machine sensors is accurate. It may not be at a level which is optimal for the embryos. So, you should also check that your eggs reflect the temperature calibration.

Check the egg shell temperature on day 2 of incubation, when the eggs are up to incubator temperature but the embryo is too small to be producing heat. The eggshell temperatures should all be within ±0.2°F (0.1°C) of the air temperature in most types of setter. If they are not, it could indicate something is wrong (for example worn door seals, sticking solenoids, etc).

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Hatchery TIPS 04

WHEN DID YOU LAST WATCH YOUR EGGS TURNING?

All hatchery managers are busy and it can be difficult to find time to just observe eggs in your setters. But, egg turning is essential for good hatchability and the turning angle, turning frequency, and the smoothness of the turn are of key importance. So, make some time to watch your eggs turning:

- Did the eggs turn when you expected them to?
- Did all the trolleys/trays turn?
- Was the turning smooth and gentle?
- Was the turning angle correct on all the trolleys/trays?

Incorrect turning angles, or complete turning failure, are among the most frequent issues we identify on hatchery visits. The impact of mildly suboptimal turning angles on hatch can be subtle, but will include increased levels of early and late dead embryos, malpositions in the late deads and also unabsorbed albumen covering some chicks. If you do not correct turning issues as soon as they are found, it will cost you chicks. Turning problems will affect embryo development most severely when they happen early in incubation.

Turning angle of 31.6 degrees is too shallow. Target is 40-45 degrees

Getting the turning angle just right at 42 degrees.

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Hatchery TIPS 05

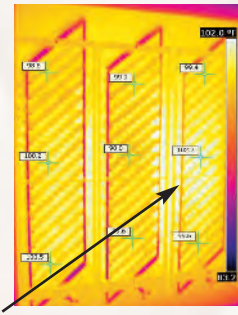
HOT EGGS DAMAGE CHICK QUALITY

There is an optimal embryo temperature range where embryos will be comfortable. When eggs get too hot, chick quality will suffer long before hatchability is affected.

Check the eggshell temperatures on days 16 to 18 of incubation, when the embryos are producing a lot of heat, to see if there are any dangerous hot-spots developing in the setters. Use a Braun ThermoScan infra-red ear thermometer, or Tiny Tag temperature loggers to monitor the eggs in the centre of the egg trays in as many different locations as you can.

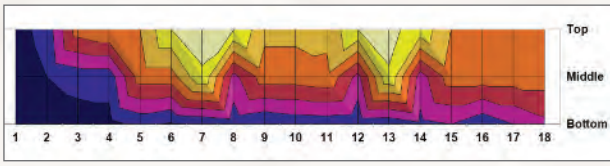
Chick quality will be affected wherever you find eggshell temperatures exceeding 102°F (38.9°C). Chicks from overheated eggs will hatch earlier, so are more prone to dehydration. They will also be paler, shorter and the yolk sac will be bigger. Unhealed navels will be more common. When chick quality is poor, not only will there be more culls and down-grades at the hatchery, but also performance on the broiler farm will be poorer. Chicks from eggs which have been overheated will not grow as well, and will tend to have higher mortality throughout the flock life. Feed conversion may also suffer.


The pale coloured chick was overheated

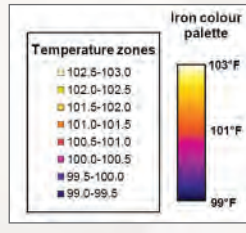

Hot area in a single stage setter

If ventilation is adequate, hatchability is not usually affected until higher eggshell temperatures are reached.

It is easy to visualise the variation in eggshell temperature in the setters by entering the temperatures into an Excel spreadsheet, and plotting a graph using the chart type 'surface' and the option 'contour'. In the example given below, taken from a fixed rack multistage setter and using a thermal image iron colour palette, the graph shows a cool spot near the door and two hot spots in stacks 7 and 13.



Places where eggshell temperatures exceed 102°F (38.9°C) indicate that action is needed. Check door seals, fan speeds, setting patterns (was the set balanced?), spray nozzles, cooling coils, solenoids, water flows, fan blades, turning angles and frequency and incoming air temperature and humidity.



HOW OFTEN DO YOU CHECK EGGS COMING IN TO YOUR HATCHERY FOR HAIRLINE CRACKS?

Identifying all the eggs that have cracked shells on arrival at the hatchery is not easy, but removing and discarding them will increase your hatchability and improve chick quality. As the use of automated egg handling on the farms increases, hairline cracks, in particular, are becoming much more common.

'Hairline' cracks can be difficult to spot. They occur when the force of an impact is just sufficient to crack the crystalline shell, but there is no obvious surface damage or disruption to the underlying shell membranes. Hairline cracks may only become obvious after a few days in the egg store when moisture from the egg contents has had time to penetrate into the crack and produce a faint grey line at the shell surface (Figure 1).

Figure 1.

A good way to detect hairline cracks is to candle the eggs because the moisture that has entered the crack becomes illuminated brightly (Figure 2).

Figure 2.

Eggs with hairline cracks can cause just as many problems as eggs with more severe shell damage. Research has shown that the hatchability of eggs with hairline cracks can be reduced by almost 25%. In addition, there is an increased level of contamination in eggs with hairline cracks which seems to be carried over to the chicks. The mortality of chicks hatched from cracked eggs to two weeks of age was almost four times that in the control group.

When the effect of hairline crack length on hatchability, egg weight loss, embryo losses, chick quality and contamination rates have been studied it is clear that substantial detrimental effects still occur in eggs with only short hairline cracks, such as that in Figure 3.

Figure 3.

So, the message is clear. Cracked eggs and those with hairline cracks are bad news for the hatchery. Not only do they reduce hatchability through increased water loss from the egg, but they are more likely to become contaminated. This contamination is carried over onto the farm by the chicks.

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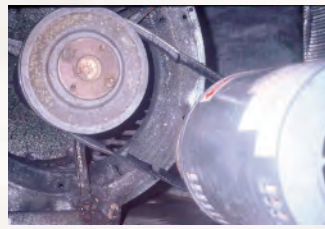
Hatchery TIPS 07

HAVE YOU GOT A HATCHERY MAINTENANCE PLAN IN PLACE?

During hatchery visits we often notice that maintenance is reactive rather than preventative – things are only fixed when they break down. This can compromise hatchability and chick quality which are the two most important performance factors a hatchery's success is measured on. A scheduled maintenance programme minimises the risk of machine failure and the impact of incorrect machine operation on hatch and quality. A few things to consider when setting up a maintenance programme are:

- Have a dedicated person responsible for maintenance reporting to the hatchery manager.
- Produce a list of all the equipment to be maintained including frequencies.
- Keep records on all performed maintenance.
- Keep track of the spare parts on hand.
- Include the building structure and ancillary equipment in the programme.
- All sensors (temperature, humidity etc) need to be calibrated regularly.

Air filters need to be checked and replaced regularly



Fan belts should be checked regularly and replaced as necessary – this belt is not fit for use.

Maintenance is required on any equipment that can affect the performance of the hatchery. This includes setters, hatchers, all chick processing equipment, any measuring equipment (thermometers, hygrometers, pressure gauges), ventilation, generators, all possible water treatment systems, alarm systems and trucks.

All maintenance should be done according to manufacturers' instructions, by using their provided checklists and their recommended maintenance intervals as a minimum. Keeping good records is useful to monitor if the same equipment keeps failing or needs more maintenance than others as this could indicate that there is an underlying problem elsewhere. Keeping track of the spare parts and their usage avoids over ordering unnecessary parts.

Some of the incubation manufacturers now offer technical audits which are extremely helpful to get you started with your maintenance program. Monitoring the equipment allows us to see if the equipment is performing within the acceptable limits and to take action if we notice unacceptable readings.

Regular visual checks should still be done several times a day to ensure temperature, humidity, ventilation and turning are all as they should be. Over time it should be possible to assess costs and benefits of the maintenance programme. Preventive maintenance generally has benefits in all industries and the hatchery is no exception. It contributes to a better hatchability and chick quality, safer work environment, reduced power and utility costs as efficiency is increased, lower insurance costs and retaining a higher value of assets.

The Aviagen Hatchery team has produced a booklet, Aviatech Hatchery Maintenance, which can be helpful when setting up a maintenance programme. http://en.aviagen.com/assets/Uploads/HatcheryMaintenanceFINAL2.pdf

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Hatchery TIPS 08

MANAGING CHICK HOLDING ROOM TEMPERATURES

Newly hatched chicks cannot regulate their body temperature very well. Body temperature in young chicks therefore depends on the surrounding environment. Yet it is crucial to help chicks stay in their thermal comfort zone after they hatch. If chicks are too hot or cold, they will use more energy during holding. If they are too hot, they will also pant and get dehydrated. These chicks will not perform well on the farm.

It is extremely busy on a hatching day in a hatchery and it can be hard to monitor and respond to chick comfort. Sometimes problems with chicks being too hot or cold are only seen when DOA numbers increase. On the other hand, it is not simple to keep chicks within their comfort zone in a chick holding room. There is not one ideal chick holding room temperature, which is suitable in all hatcheries, because it depends on chick size, physical condition, room humidity, chick box type and air speed around the boxes. You need to find the ideal holding room temperatures for different seasons in your own hatchery.

These chicks are too hot.

One Aviagen internal study has shown that vent temperature is a good indicator of chick comfort. A chick will be comfortable when its vent temperature is in the range of 103-105°F (39.4-40.6°C). Identify sample chicks and measure chick vent temperature hourly in the chick holding room. If chick vent temperature is too high, lower room temperature settings. If chick vent temperature is low, then increase room temperature settings.

If chicks are sampled and chick vent temperature measured at different locations in the chick holding room you can determine where any hot/cold spots are. Then you can use the information to improve chick trolley design, chick trolley placement in the room, air circulation in the room and room ventilation, so that all chicks will be comfortable throughout the entire chick holding room. Using Excel to map the temperature distribution will help to identify problem areas. In Fig.1 the chicks were all slightly cold, except in the back right corner, furthest from the door. Raising the room temperature slightly, with some additional cooling fans in the back corner allowed the chicks to maintain a vent temperature above 103°F.

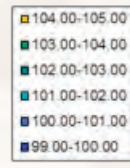

Fig. 1. Chick vent temperature by location.