

The chick quality versus quantity conundrum



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How do we strive to ensure that what we can hatch and deliver to our customers is the best quality possible?

The hatchery manager has some control but there are a number of factors which are outside the control of the hatchery including:

- Genetics.
- The rearing farm.
- Breeder production farm.
- Farm sanitation/vaccinations/disease.
- Farm personal hygiene/biosecurity.
- Nutrition.
- Transportation.
- Ventilation/temperature controls.
- Egg storage, planning constraints.

Factors which the hatchery manager can control include:

- Incubation, setter and hatcher controls.
- Ventilation/temperature controls.
- Hatch window.
- Hatchery processing.
- Hatchery sanitation.
- Personal hygiene/biosecurity.
- Embryonic breakout.

Genetics

Genetics are changing all the time in order to achieve the demands set by the customers. They require the day old chick to grow quickly, efficiently with the least mortality possible. With changing genetics, scientists are telling us that the embryo produces twice as much heat in the latter stages of incubation than embryos of 20 years ago. Too much heat being produced during this period affects and damages the internal organs so the chicks will not grow to their full potential during the broiler growing period. This puts the hatchery manager under greater pressure to ensure the chick does not overheat during the incubation period which can have a detrimental effect on broiler performance.

Breeder flock farms

One of the biggest problems for a hatchery is receiving reject and contaminated eggs,

which will eventually infect the day-old chick and affect performance as a broiler or breeder. The hatchery may receive what appears to be a clean shell surface egg, free from faecal material but what has happened to that egg as soon as it has been laid in the nest box on the breeder farm?

On many occasions I have carried out a hatchery embryonic breakout survey only to find that the eggs are very heavily contaminated. Checking the hatchery quality assurance program, the disinfectant procedures and application of chemical products appears not to be at fault.

Today with increased labour costs many breeder flock farms are changing from individual hand collection to automatic systems, either individual nests or communal nests which are widely used with eggs rolling on to a conveyor belt and going to one central point for grading and packing.

The question is are the conventional and automatic systems being managed correctly to produce a clean, bacterial free hatching egg?

Whenever there is an issue with chick quality with higher than normal seven-day mortality, it is the hatchery that gets the brunt of customer complaints – never the source of infection, which in some cases is the breeder flock farm.

Egg size

The rearing/flock farm also plays an important part to ensure the birds are even and the feed amounts are correct for body weight and egg size. If the egg size is too big this will also have an effect on chick quality.

Nutrition

Nutrition plays a very important role to ensure that the birds during the rearing and production period have the correct feed specification and formulation. Today's broiler breeders are peaking higher in production than ever before. Therefore, correct feed amounts are essential to provide the embryo and day old chick with the vital nutritional requirements to provide a good viable quality chick to perform in the

growing period. This is especially important in the first few weeks where the breeders are at their greatest stress coming up to peak egg production.

Incubators

There are a number of incubator manufacturers available in the market. With today's modern meat strain bird the tendency when building a new hatchery installation is to use a single stage design. Single stage incubation has a better temperature control for embryonic heat production than multi-stage incubation.

I am always concerned that incubator capacities are getting too big. The customer dictates to the incubator manufacturer that they need to keep the setter/hatcher price down as low as possible so the manufacturer will offer larger machines. In my experience over the years this is not always the correct solution as I have seen more chick quality issues with the larger machines. Problems are caused by not filling the machines to their full egg capacity.

Partly filled machines will affect air flow which will take the least form of resistance affecting circulation.

There are still a considerable number of multi-stage incubators around the world. With today's meat strain chick attention to detail is more important than ever to ensure the setters and hatchers are working correctly.

One of the biggest issues I see when visiting hatcheries is the lack of maintenance and calibration of incubation machinery. Each incubator manufacture has its own peculiarities to deal with but most importantly, temperature set points, door seals, trolley/wheel seals, turning mechanism, heater bars, cooling systems, humidity sprays etc are critical to ensure the correct working of the machines.

Ventilation

Ventilation is the most important installation in a hatchery. If you have not installed the correct system it does not matter what type/make of setter or hatcher then the

system will not work correctly to provide a quality chick.

Some incubator manufacturers will insist they install their own ventilation system which is correct.

A number of hatchery customers look upon ventilation as a secondary factor when incubating hatching eggs and is not important. Sometimes they will leave the installation to companies which have no idea how to ventilate a hatchery but probably know how to ventilate a shopping centre.

Most incubator manufacturers want to sell incubation equipment only and there is a degree of competition from one company to another to get the business.

When it comes to installing ventilation equipment I've known the incubator manufacturer asking the customer. "Do you want a cheap or an expensive system"? There is only one system and that is the correct system.

Another concern is that incubation manufacturers when installing ventilation equipment reduce the air handling (HVAC) to a minimum to reduce the cost. If there is only one air handling unit and it breaks down the whole hatchery comes to a standstill.

To provide the correct hatchery ventilation the six criteria in the order of importance are:

- Oxygen.
- Air volume.
- Relative humidity.
- Room pressures.
- Air distribution.
- Temperature.

Setters

Setter hatcher rooms should have a fresh air and an exhaust plenum. The fresh air plenums should be completely sealed. Ideally humidity should be provided by steam rather than evaporative or water spray which cools the incoming air.

The setter and hatcher fresh air plenum should have a positive pressure.

The air supply should be provided by a HVAC air handling unit or a variable speed fan air handling unit controlled by pressure. The air handling unit should be capable of heating and cooling the incoming air (water heating radiators and water cooling/gas condensing coils).

The speed of the fan should not be controlled by temperature.

The room temperature (25-26°C) and humidity (55-62%RH) should remain constant throughout the year (24 hours per day, seven days per week and 52 weeks of the year). The air temperature distribution in the fresh air plenum/room should be even from one end of the room to the other.

There should be no additional pressure relief grills, modulating dampers, shutters or additional extraction fans fitted to the exhaust plenum fascia.

Setter exhaust plenum

The setter exhaust plenum should have a variable speed extraction fan connected to a sensor and pressure controller. The extraction should not be controlled by temperature. The exhaust fan should have back draught shutters and a wind protection hood.

The setter exhaust plenum should be set at neutral pressure 0.00 or slightly negative according to the manufacturer's recommendations.

The exhaust from the setter machines should enter the exhaust plenum with no additional pressure relief grills, modulating dampers or shutters from the fresh air plenum.

When the personal door to the exhaust plenum is opened there should be an immediate reaction to the extraction fan to build up speed. The exhaust fan is trying to maintain a neutral pressure.

Any fan extracting in a chimney exhaust should be installed at the top of the duct work with a wind protection hood and a back draught shutter at the bottom.

In some cases during the cold seasons probably in the northern and southern hemispheres the exhaust air from the setter will be diverted into a heat exchanger HVAC unit to recover the energy to help heat the hatchery.

Hatcher exhaust plenum

The hatcher exhaust should be a variable speed extraction fan and controlled by a pressure sensor and controller. The speed of the fan should not be controlled by temperature.

When the personal door to the exhaust plenum is opened there should be an immediate reaction to the extraction fan building up speed. The exhaust fan is trying to maintain a neutral pressure 0.00 or slightly negative according to the manufacturer's recommendations.

In a chimney type exhaust the exhaust fan should be installed at the top of the duct work with a wind protection hood and a back draught shutter at the bottom.

All rooms within a hatchery should have their own air supplied by a dedicated air handling unit to provide the correct air volume (fresh air), humidity, pressure, air distribution and temperature. The air handling units should be positioned at the clean end of the hatchery or if a HVAC unit positioned above each room to be ventilated. Doors to each room should have a good seal and be shut at all times.

Hatch window

The incubation cycle should be such that the chicks do not hatch too early dehydrating in the hatcher which will create higher than normal chick quality problems during the

growing period. As a guide there should be no more than 25% hatched 24 hours before pull and 75% 12 hours before pull calculated from the total hatch.

Transportation

Chicks should be transported with good air exchange and the correct temperature maintained at all times.

The broiler growing farm

The hatchery can provide the ideal quality chick but on arrival at the growing farm the conditions may not be correct. The chick truck may have to wait as the farm is not ready to accept chicks, the temperature of the floor and shed is not correct, not enough water or feed available at floor level to give the chicks a good start which will affect chick quality. If problems occur with quality or mortality it is the hatchery that will be blamed not the grower.

Personal hygiene

At a number of hatcheries that I visit the showering facilities differ for the employees, management, upper management and owners. The employees have the basic cold water treatment where upper management have the delights of hot water and plenty of washing detergents. When it comes to personal hygiene there is no difference and everyone should be treated the same using hot water to shower correctly.

Embryonic breakout

Accurate embryonic breakout is a management tool to understand breeder flock and hatchery issues. This should be carried out regularly to understand problems and where improvements can be made.

The breakout should be simple using just four groups:

- Infertile.
- Early embryonic death (1-7 days).
- Mid term death (8-14 days).
- Late death (15-21 days).

Too many categories will become complicated and the customer will not carry out the analysis. We need to have an overview just to understand the basic problems.

Conclusion

We must remember that broiler growing starts the day you incubate the egg. If the hatchery gets it wrong in the first 21 days of incubation then during the second stage the chicks will not grow to their full potential on the broiler farm. ■