Chick Master®

e-News

MARCH 2007

Issue Number 8

What TEMPERATURE should your COOLING WATER be set at?

So you were wondering whether or not your chiller output temperature is set correctly were you? Well, maybe you weren't. In fact, how many hatcheries ever ask themselves if they could improve quality, yield and/or costs by changing the target temperature for the water leaving their chillers. (We're not writing names down, so you can be honest in your answer!)

Hatchery chiller (left) and water storage tanks

The reason most people don't ask the question is that it's not that easy a question to answer. There are many factors involved in the correct solution and, while there may be someone alive who could write an article telling you exactly how to evaluate those factors to come to a finite answer, I assure you that I am not that person! But, I can make some suggestions that might help you.

First, you need to know how your current chiller is operating. There have been many changes over the years to chiller operational philosophies, so what may have been correct when you bought it is not necessarily correct now. Proper functioning of a chiller requires that you have a correctly sized storage tank, correctly sized piping in the hatchery, adequate chiller capacity to remove the heat in the cooling medium and proper settings on the exiting water temperature.

The chiller cannot run above its capacity. Simple enough. Since most hatcheries will endure the warmest part of their day in the late afternoon, that is the time when the chiller is likely to be most stressed (It's also the time most electric suppliers charge the highest rates!). If you had no storage tank, the capacity of the chiller would define the capacity of your chilling system. However, the larger your storage tank, the longer your system can function at a capacity higher than the chiller rating. You certainly want your storage tank to have more than a 5 minute system reserve with a 10-15 minute reserve supply being a good thing. If you have less reserve, increasing reserve tank capacity is not an expensive act.

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See us at:
SAPA (Avi Africa) 2007
23 to 25 April
Midrand, Johannesburg
and CM Seminar on 25th

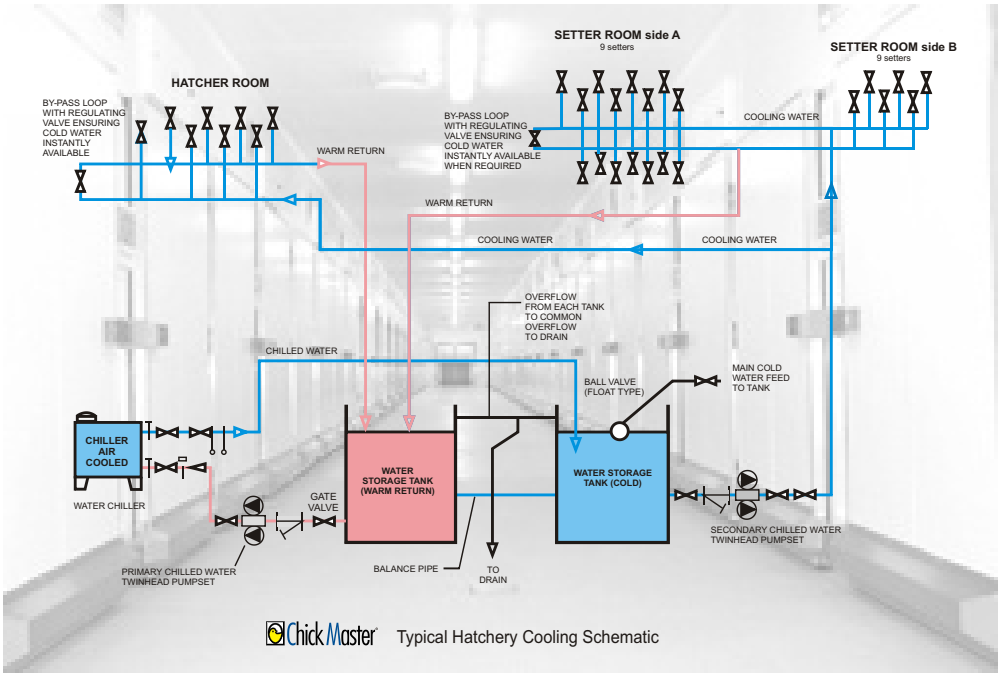
To Our Hatchery Friends:

Chick Master has been busy since our last e-News exhibiting at major poultry shows in Atlanta and Bangkok as well as hosting a Technical Hatchery Seminar in Cairo, Egypt. We are planning further seminars and trade shows around the world so please check our website for details of upcoming events in your area.

At the Atlanta and Bangkok shows our new GeMeric control upgrade (see page 4) proved to be a very popular innovation and a very cost effective alternative to a full control system upgrade. Not only do you get probe based, state-of-the-art measurement of temperature and humidity but you are able to remove all of your mercury based control elements.

Our new online Parts Shop is gaining an increasing number of 'hits' with new customers signing up every week, each gaining valuable points on every item that they buy. You will be greeted by our new HOOCHO bird avatar when you visit chickmaster.com to browse the many thousands of Chick Master parts.

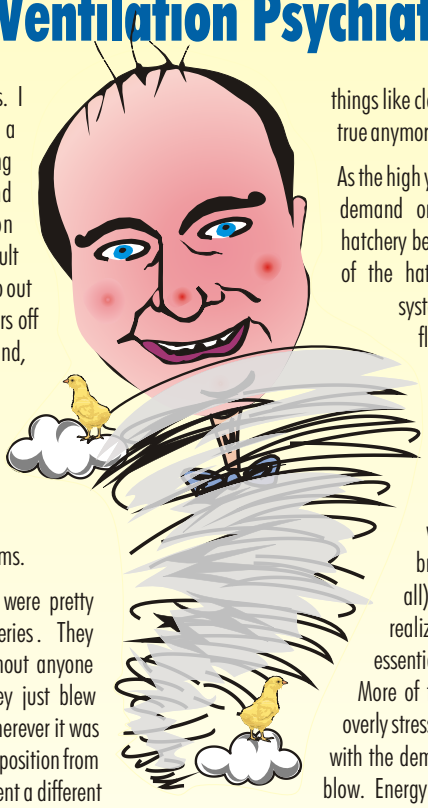
Finally, if anybody believes that Heat Recovery and Energy Management will not play an increasingly important part in virtually everybody's life, think again. Already Chick Master is making a difference around the world with projects, using ground breaking technology that is helping to save up to 35% of a hatchery's total energy bill.



Chick Master Typical Hatchery Cooling Schematic

Chick Master® e-News

A day at the Ventilation Psychiatrist's office



Hello there. I'm Ty. Ty Phoon that is. I am a certified psychiatrist with a practice that deals solely in treating frustrated, underappreciated and overworked hatchery ventilation systems. You think you have a difficult job? Hey some of my customers are so out of control that they blow all the papers off my desk, cause my glasses to fog up and, well, you can imagine what the overly humid ones "dew" to my couch. Ah well you didn't start reading this to listen to my problems.

Let me tell you a bit about their problems.

For years most ventilation systems were pretty happy. They lived in multistage hatcheries. They got all the energy they needed without anyone asking what they did with it. They just blew around the building all day, going wherever it was easiest to go. If they ran into some opposition from a wall or a small opening, they just went a different way or went nowhere at all. The people who owned the hatchery just wanted them to stay out of the limelight. Don't ask for more allowance, don't make us look bad by causing my eggs not to hatch. Just do whatever it is you were supposed to do and be the silent child. If anything does get broken, make sure it can be blamed on those pesky setters and hatchers (now there's a psychiatric case that's really tough!).

Unfortunately, times changed. Some of the hatcheries adopted new offspring single stage setters. Most of them changed to high yield birds that they wanted the setters and hatchers to take care of. Some of them even started looking at their utility bills. That's when my practice took off!

The average ventilation system in a hatchery was designed to move air and, in some cases, water. The general assumption was that since air was necessary for the embryo to breathe, it was the means to remove humidity that had to be evicted and it was pretty much free. That might have been true before things like clean air acts and oil crises. It's not true anymore.

As the high yield breeds came on-stream, the demand on ventilation in a multistage hatchery became challenged. In the cases of the hatcheries who had virtually no system other than pressurized air flows, the systems simply couldn't cope. As better farm and transport practices increased the fertility of the egg packs, the strain on the cooling and humidity removal systems got worse. Air flows increased to the breaking point. All (well, almost all) of the incubator manufacturers realized that water cooling was essential to proper hatching procedure. More of the ventilation systems became overly stressed. They were not able to cope with the demands. Then came the crushing blow. Energy costs doubled, redoubled and threatened to redouble again. Existing systems became grotesquely unacceptable.

By now you are wondering why I chose to specialize as I have. Let me tell you what I saw when I looked at the families we lovingly call "hatcheries".

In cool climate hatcheries we must heat air to bring it up to an acceptable temperature for use in cooling the setters and hatchers. We must also adjust the humidity. Cool air is also usually quite dry air. When it is heated, it becomes extremely dry air. If the air is not humidified in the building itself, it must be humidified in the setter or hatcher. That does provide cooling, but the bio-security and embryo health/viability issues it raises are not acceptable to a single stage hatchery. In many multistage hatcheries it is an essential compromise to the burdensome cost of upgrading the ventilation system. In hatcheries with equipment that has low levels of water cooling capability, it is the only choice.

Continued on page 4 column 1

Cooling Water Temperature continued from page 1

Chances are you aren't going to mess with your pipe distribution system. It only becomes an issue if you are not able to circulate enough water to cool your setters and hatchers and get the water back to the chiller at a temperature that the chiller can cool back down before the reserve tank runs too hot. Usually a problem involving piping only comes when expansions have occurred without new piping. If you do have a situation where the setters or hatchers are unable to get adequate water for cooling you may be able to improve the situation by putting flow restrictors (or more restrictive ones) in your setters and hatchers. This will increase the temperature of the returning water but it will increase the availability of chilled water to the last units on the line.

Chiller capacity itself is partially defined by the load capacity of the chiller and partially a function of the efficiency at which the chillers are run. Most of the chillers in hatcheries are not designed to run constantly. They are most efficient when they are dealing with making a larger change in water temperature. If the difference between "cold" and "hot" is only a few degrees, the chiller will be very inefficient. The greater the difference, the better the utilization of electricity and the less stress on the compressors. Check your settings. Try widening the gap between the on and off settings. This would be particularly true in the cool months where your supply air in the hatchery is also a few degrees (or more) cooler than it is in the summer.

Remember that the heat load on setters and hatchers has increased dramatically as egg/chick sizes have increased. A chiller that is 20 years old was probably sized for a load 25% to 50% lower than what it is dealing with today. You may have to change it or you may find that a heat recovery system makes great economic sense. That is a topic for another day in this newsletter, but it might be a topic for today if you are concerned with the energy efficiency of your hatchery. Feel free to call your Chick Master rep if you are concerned.

Oh, you wanted a numeric answer to the rhetorical question? OK 58-60°F or 15°C is a pretty good target. But there is no single correct answer for all places. It depends on the type of circulation system you use, the cost of energy, whether you use humidity controls or temperature control (ugh!) in your setters, and so on. One thing is for sure if you circulate water much colder than this, you will have cold spots and condensation problems in either setters, hatchers or both. Try not to have water any colder. If you get much warmer, you will have to move the water through the setters and hatchers virtually unrestricted - very energy inefficient and very demanding on your circulation system.

The best advice we can give you if you want an informed opinion, ask us. We're here to help

Chick Master® e-News

The *Art of* STAGE PROGRAMMING

Part Five: Auto Damper High Humidity

Continuing the series of Articles published in the last four issues of Chick Master E-news Bulletins, we are now in a position to look at the next stage of the "Step" program. Examining, in detail, what is happening, how it is happening and why it is happening.

Below is our standard Stage 5 program used in many Avída hatcheries throughout the world.

Stage Number	5
Temp Set Point	99.7
Temp High Alarm	100.9
Temp Low Alarm	99.2
Humid Set Point	45.0
Humid High Alarm	65.0
Humid Low Alarm	30.0
Man. Damper Set Point	10.0
Min. Damper Set Point	10.0
Damper Mode	AHC
Cooling Mode	Wat
Aux Fan On At Damper	40.0
Aux Fan Auto/Man/Off	off
CO2 Set Point	0.0
CO2 High Alarm	2.0
CO2 Low Alarm	0.0
Turning Tilt Time	55.0
Level Time (mins)	5.0
Time In Hours	72.0
	Auto Damper
	High Humidity

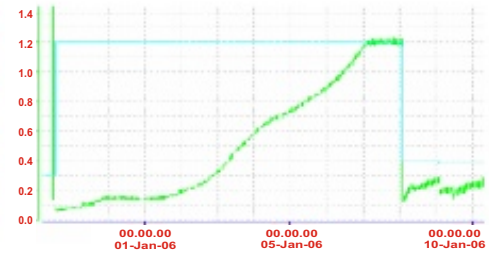
Chick Master stage program showing Stage Five

STAGE 5: Auto Damper High Humidity

As detailed in the E-News #7 covering Stage 4, this is what, in many ways, encapsulates the essence of the single stage process, i.e. high humidity, very stable temperature, good heat transfer, and high levels of CO_2. All these elements are essential to help give embryos the best possible start.

We are now arriving at 6 days of incubation in the majority of cases (but it could be up to 8 days in certain environmental conditions). We cannot continue any longer with these closed damper conditions since eggs have to now start losing weight and embryos will start to change from absorbing heat (Endothermic) to producing heat (Exothermic).

These changes are taken into account by switching the damper control from Manual Closed, to Automatic Humidity Control (AHC). The changes to the humidity set point ensure that the damper will open. At the same time the temperature set point is lowered in order to help offset the increasing heat output of the embryos and humidity will decrease.



Graph in % CO_2 from a typical Chick Master Galaxy System plot

It will also be noted that the CO_2 level will reduce as the damper opens since it is not necessary to maintain the same higher levels that exist during Stage 4. The conditioning of the embryos has taken place and indeed it is not a good thing to have high CO_2 levels in the later stages of incubation.

Graph in % RH from a typical Chick Master Galaxy System plot

During this stage turning will change to a 55 minute turn interval with an increased level time from 1 minute to 5 minutes. This, again, is helping to re-distribute the heat from the embryos within the setter cabinet.

We are now ready to advance to the next stage where we have to take into account all the above elements in order to successfully continue incubation. Full details of this will be in the next edition of the Chick Master E-news, as we continue with The Art of Stage Programming

David Marsh

Angel Salazar

Ask the Eggsperts

Your chance to ask our hatchery and embryology experts the questions.

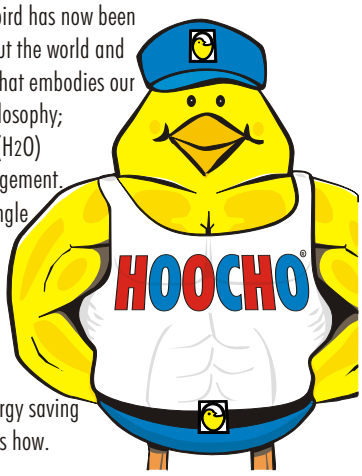
Q How important is an increased concentration of CO_2 in the setter during the early stages of incubation and what effect does it have on the cardio-vascular development of the embryo?

G.S. - Canada

A By increasing the level of CO_2 during the first 4 to 6 days of incubation, a hypoxic type of environment is created. This is like an athlete training at altitude and promotes very strong cardio vascular development. If this is done from the start of incubation, then it has the best effect. By using Chick Master's new CO_2 injection system, this can be achieved very easily, resulting in improved chick numbers and quality.

Do you HOOCHO?

Our HOOCHO bird has now been seen throughout the world and is the symbol that embodies our incubation philosophy; water cooling (H_2O) and CO_2 management. All systems, single or multistage, can benefit from HOOCHO for improved chicks and significant energy saving - ask for details how.



Chick Master e-News

A day at the ventilation psychiatrist's office - continued

That air is then exhausted to the atmosphere. Think of the energy waste.

When water/liquid cooling does exist, the water/liquid is warmed in the process of cooling the setter and hatcher. That warmed water is then either expelled at a cost or cooled by a chiller also at a capital cost and significant operating cost. Think of the energy waste.

Energy Management AND **Environmental Control Systems**

But energy waste or not, the reason the ventilation systems existed in the first place was to ensure that the eggs turned into chicks. In multistage, only a part of the egg set needs to be warmed. An equal part of the set is looking to shed heat. They cooperate well. When the humidity gets too low, the spray is turned on. Everyone expects to lose some of the early embryos, so the damage that it does is ignored. When the damper wants to open or close it does so without concern for CO_2 levels. It can't get them high enough to do any good for the young embryos and there aren't enough old embryos to cause it to get too high. A life of averages and a life of simplicity for the ventilation system.

Single stage sheds new light on the issues and leads to questioning how the ventilation system works in all hatcheries. The thought process was simple - we need to bring cold eggs up to temperature and keep them there. As they get older, we need to stop adding heat and begin removing heat. We would like carbon dioxide to be fairly high in the beginning (most of the time!) and low at the end. We want to manage the humidity so it is higher in the beginning and lower at the end. Simple, but the demands on the ventilation system are staggering compared to the multistage demands.

The heating capability of the setter must bring the egg mass up to temperature fairly rapidly. There is certainly some correlation between egg age, the amount of time it takes to get to incubation temperature and early embryo mortality. There is no documentary evidence of what that correlation is but it is pretty clear that more than 10 hours will cause hatch loss with old eggs.

Water cooling must be adequate to keep the egg mass cool without adding unnecessary air that could disrupt the humidity and carbon dioxide balance.

Air flow should be that which is necessary to keep the carbon dioxide levels where we want them. More flow than that is simply a waste of energy. However, the air that is needed must be of a reasonable temperature and humidity content. Cool air or warm air can be overcome by the setter. Cold air and hot air cannot be. Dry air and humid air CANNOT be overcome by the setter once they go outside the guidelines supplied by the manufacturer. Nature will not compromise.

But, there is hope for the poor systems that blow into my office, tears of dew streaming from the eye of their storms. Chick Master has invested into the research necessary to improve the process of ventilation in hatcheries. They have created a kind of "school of higher learning" for these poor, wasteful systems that meant to be good, but just aren't.

So now, in a well designed system, all of the ventilation functions are carried out with little or no energy waste. In many cases, much of the energy can be recovered by recycling the heat. Not only will the capital investment be moderated by proper specifications, but the energy costs and installation costs will be lowered as well.

If you think that your ventilation system is well-adjusted and a model teenager, you are probably wrong. If your system is a toddler or a pre-teen and you invested wisely, there is hope that it will stay a productive part of your family for a while longer. But, you can rest assured that my business is booming. I will be investing in more couches because my sales force--- single stage process, oil prices, avian flu, feed conversion ratios, sewer and water taxes---is getting stronger by the day. Your ventilation system will be coming to see me

It's only a matter of time and your wasted money

FUN TIME

Chicken and the Egg

A chicken and an egg are lying in bed. The chicken is leaning against the headboard smoking a cigarette with a satisfied smile on its face. The egg, looking a bit ticked off, grabs the sheet, rolls over and says ... **"Well, I guess we finally answered "THAT question!"**

Introducing the

GeMeric

Converts your thermostat based controls to probe-based technology without the expense of replacing your existing unit

A truly generic, one or two point, control upgrade designed for use with virtually any make of setter or hatcher

The cost-effective alternative to a full control system upgrade

DID YOU KNOW?

The first Poultry Exhibition was held in the USA on November 14, 1849. There were 219 exhibitors, 1,023 birds, and over 10,000 visitors.

Chick Master

Please contact us for any product or support information you may require

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