

## Granny's Hatchery

### Leading the World in Energy Efficient Singlestage Hatcheries

Eggs and their developing chicks within are significant producers of heat energy. This fact, of course, has been known since the year one, but, until now, we have been happy to exhaust all this valuable heat into the atmosphere while at the same time paying to heat fresh air to pump back into the same hatchery. Energy was cheap. Today things are changing, energy costs are rising all over the world. Energy efficiency is now a necessity and Granny's Hatchery, Winnipeg, Manitoba in the cold Canadian climate, is particularly well placed to take advantage of the unique Chick Master Heat Recovery and Energy Management technology.



Granny's Headquarters, Winnipeg, Manitoba, Canada

from their Chick Master singlestage incubation systems using the latest plate heat exchange technology, but they are also taking advantage of the vast supplies of ground water to provide free heat to their hatchery. It may seem strange to think that ground water of around 44°F (6.6°C) can actually help to 'heat' even colder ambient air of 3-31°F (-35°C) to above freezing point. In fact, used in conjunction with their Chick Master Heat Recovery system it is possible to raise an ambient temperature of minus 31°F (-35°C) all the way to room temperature of 79°F (26°C) without having to use any other heating energy. Depending on the location and ambient conditions it is possible to save at least 50% of a normal energy bill, and substantially reduce the carbon footprint.

Not only is the Granny's Hatchery efficiently recovering heat

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To Our Hatchery Friends:

## Chick Master is helping to reduce your carbon footprint

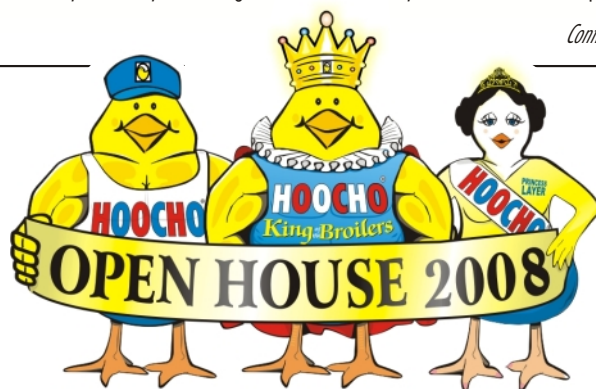
Little changes we make now could safeguard the environment for future generations by reducing Global Warming. Chick Master's unique Energy Management and Environmental Control systems are helping to reduce some hatchery utility bills by 50% or more which not only saves you money and helps the environment but greatly reduces your carbon footprint.

How do we achieve this, you may well ask? Well, typically for every 2.5kW of cooling energy dissipated your water chiller(s) will consume on average of 1kW of electricity. Heat energy from your developing embryos is reclaimed from the 'warmed' hatchery cooling water (primary heat recovery) and recycled to increase the temperature of the hatchery's incoming air. This reduces the load on the chiller making significant reductions in electrical consumption. This is in addition to the gas energy saved from the substantially reduced heating requirement for the air serving the hatchery. Recovered exhaust heat from setters and hatcher is also utilized to warm the hatchery incoming fresh air (secondary heat recovery).

The system will even facilitate substantial energy savings even during the summer months due to the cool nights (evening temperatures drop well below target hatchery air temperature for much of the year in most areas of the world).

Chick Master has installed its revolutionary system in many hatcheries around the world. All have experienced substantial financial benefits and a much reduced carbon footprint.

Please contact us for more details.



**June 11-12, 2008 - Bridgwater, UK**

*With an evening reception on June 10*



Chick Master is pleased to invite you to attend the 2008 Open House at our facility in Bridgwater, UK.

We have organized a power-packed two day program of presentations on the process of incubation, the importance of good ventilation, and the latest technology and developments in energy management and environmental control. The latest equipment innovations will be on display and open for discussion.

**Time is running out to take advantage of the reduced cost participation fee.**

**Download a registration form NOW at [www.chickmaster.com](http://www.chickmaster.com)**



*Granny's Hatchery continued*

Granny's Hatchery has installed twelve Chick Master Avida single stage incubation systems setting nearly 2 million eggs over the three week setting and hatching cycle. Granny's opted for the state-of-the-art single stage Avida type system which allows eggs of the same age from the same flock to be set at the same time. This has two main benefits: one, all the eggs develop simultaneously and can be given the correct conditions for every stage in their development, and two, all eggs are removed from the machine at the same time allowing the entire incubator to be cleaned and thoroughly sanitized every 18 days. Hygiene has become a very important issue in intensive food production and single stage systems have helped to make hatcheries much more bio-secure. Conversely, the standard multistage incubation systems set eggs of different ages in

## WHAT CAUSES EARLY EMBRYO MORTALITY? AND WHAT CAN YOUR HATCHERY DO ABOUT IT

There are many factors that enter into the problem called "early embryo mortality". Regardless of the cause, for a hatching egg producer this means lost income. For a hatchery operator, it could mean the difference between an excellent hatch of fertile eggs and a poor hatch. Again, lost income.

Very often the attempts to minimize the problem of early mortality develops into a "ping-pong game" of blame-shifting. The farm feels that it delivers good vigorous embryos, but they die in early incubation. The farm asks, "Why did they die?" The hatchery says, "Because they were weakened somehow before they got here". In this series of articles we will look in some depth at this problem. First we'll consider the possible causes of early embryo mortality and how this can be influenced from the time the egg is laid and collected on the farm. We will then look at egg transportation to the hatchery, egg reception, storage, preparation for setting and finally to the influence of various incubation techniques.

### BREEDERS

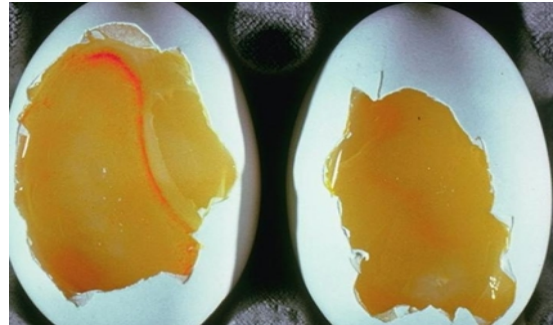
There are many factors which influence the ability of breeders to produce fertile eggs. Once that fertile egg is created an essential consideration is ensuring that the living organism within these fertile eggs (the germinal disc), is and remains in prime condition. There is no other way to produce a first quality chick. Some of the factors that impact fertile egg quality include:

- Mating ratio
- Breeder body weight and sexual maturity
- Nutrition
- Disease status
- Egg quality
- Breeder house management

The hatchery is on the receiving end of the egg production. One important function it must perform is to predict the number of first quality chicks that will be obtained from the eggs. The hatchery must produce the number of chicks required for the grower farms so it must be aware of the historical information about each flock and the conditions that the specific eggs to be set have been subjected to. Otherwise, predicting a hatch with any degree of accuracy is impossible.

For the purpose of this article, let's pick two of the factors from the list and examine reasons why they may impact upon the embryo quality. Breeder body weight and sexual maturity (e.g. in broiler parents);

The best performing flocks are those which are at the primary breeder's body weight target when they are given their light stimulation. The light stimulation itself should be given at the recommended age given by the primary breeder.



*Typical early dead blood rings can be seen on the left*

These flocks will then be able to achieve the primary breeder's body weight targets and ramp up quickly to peak egg production.

With both males and females, high peaks of fertility and egg production will be achieved.

### BREEDER HOUSE MANAGEMENT

This important aspect of production includes frequency of egg collection, breeder house temperature and humidity, nest hygiene, litter management and other important practices such as hatching egg handling. Let's take one extremely important part of hatching egg handling at the farm - that of egg temperature immediately after lay and consider some important points. During a period of 22-24 hours the egg moves from the hen's ovary through the oviduct to oviposition (laying). Cell division begins to take place during this period. At lay the germinal disc consists of approximately 60,000 cells. These cells have begun the process of organization into distinct groups (differentiation), even at this very early stage. We are discussing a living organism. It is crucial to remember that inappropriate handling or storage conditions beginning from the moment of lay can dramatically reduce the chances of producing a healthy chick from that egg.

Normal cell division within the germinal disc will continue above 27°C (80.6°F) and slows down dramatically below 26°C (78.8°F). This process stops at 21°C (69.8°F) which is considered to be physiological zero. If cell division is allowed to continue for as much as 5 hours after lay, the egg is less likely to hatch as a result of increased early embryonic death. Getting the egg core at or below physiological zero is an important aspect of embryonic preservation.

Procedures should be established to ensure uniform cooling of eggs to 20-21°C (68 - 69.8°F) takes place within 4 hours from the time of collection from the nest. Frequent egg collection allows eggs to reach physiological zero at similar stages of embryonic development. Automatic nests should be run at least 3 times per day and manual nest eggs should be collected at least 4 times per day.

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*Geo-thermal supply and return lines*

six batches over an 18 day period. Hotter older eggs helping to warm cooler younger eggs. This means that all of the developing eggs have to be treated the same, despite differences in their developmental requirements. Another drawback is that the incubator can never be thoroughly cleaned unless the machine is taken out of service.

With the installation of Chick Master Single Stage Incubators and Heat Recovery systems the Granny's Hatchery is the most advanced in the World. They are a shining example to the industry of exactly what can be achieved, not only in maximizing the hatchability of their eggs and the improved levels of bio-security but how to maximize the energy saving potential of the resources that are at our disposal 🌱



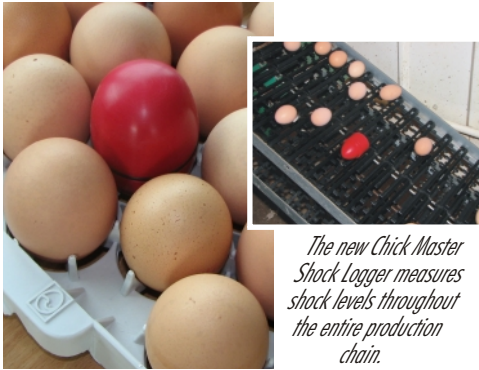
*What Causes Early Embryo Mortality? Continued from page 2 column 3.*

Once eggs are collected they should be stored in a cool environment within 30 minutes. Some common farm problems that do exist are:

- Eggs left in the nests getting re-warmed when the nest is occupied by another bird.
- Broody birds sitting on eggs in the nests.
- Poor ventilation of roll away auto nests so that temperatures are above 27°C (80.6°F).
- Eggs packed onto fiber trays which slow down the rate of cooling to greater than 6 hours.
- Eggs held in the breeder house until the end of the working day or, on occasion, a part trolley left overnight until it is filled the next day.
- Egg storage room doors left open during hot or cold spells.
- Insufficient temperature control due to poor insulation or cooler capacity of the egg storage room.
- No provision or control of egg storage room humidity.
- Farm trolleys with eggs held outside egg storage prior to loading on the hatchery egg truck.

Let's now take a closer look though, as perhaps there are indeed ways to monitor and therefore control more of the process than we would at first think!

## HATCHING, EGG HANDLING, TEMPERATURE, HUMIDITY AND SHOCK



*The new Chick Master Shock Logger measures shock levels throughout the entire production chain.*

One vital factor which can be monitored and controlled is the potential for differences in temperature that occur between egg storage conditions on the farms as compared to egg transportation and storage conditions at the hatchery. The rule is to ensure that the temperature always moves in the same direction from the time the egg is laid downwards!! It is also acceptable to hold the temperature constant. The only time temperature is allowed to increase is when the eggs are being prepared for setting at the hatchery. If this is achieved, the temperature profile of the eggs life will only form one "V", not a series of V's" (which actually become W's). With each "W" comes a challenge to the viability of the living organism. The use of temperature data loggers is essential in the monitoring and control of this part of the process.

*Continued on page 4 column 1*

## An interview with a panel of average Chick Master Single stage customers

*Continued from issues #10 and 11*

**Q: Is the meat yield there from your single stage birds?**

**A:** Absolutely, although the statistics are very hard to track. What we know is that downgrades are significantly reduced. We don't know why but it seems to be because the bird is simply healthier. We also have some users reporting that the percentage of meat yield per pound of bird is better in single stage birds. There is no hard documentation available to show you, but it seems pretty easy to believe from all the related studies and observations from very knowledgeable people in the industry.

**Q: How important is the equipment itself?**

**A:** Obviously very important. Some of the equipment on the market has a marginal ability to perform. However, there are several pieces of equipment that should work. For us, the real key was the technical support provided by Chick Master. This process is crossing ground no one has ever been on before. Having knowledgeable hatchery people visiting to train, evaluate and report back to us has been the key to success. The technical reports are the key to process improvement.

**Q: Is it all because of Chick Master that you have been successful?**

**A:** Absolutely not. The single stage process has given us the opportunity to look at our entire hatching process. With Chick Master's help we have improved on egg handling, egg transport, egg storage, matching setter and hatcher profiles to potentially poor-performing egg packs. We have good maintenance programs, management tools that allow us to control the process and feedback reporting systems that allow to take corrective action. Most of this was either not possible or at least not viable in multistage processes.

**Q: What about energy cost?**

**A:** Without a doubt the energy cost is higher per egg than it would be on a new Classic installation, for example. It is very likely to be comparable to the cost of running older, thermostat controlled machines. However, once we adopted the principle of HOOCHO management we narrowed the gap considerably. Many of us also have or will soon have the Chick Master energy management system that makes the difference between our current energy costs and future costs at worst a non-issue and, in several cases, saves us thousands of dollars. The energy management system is not required for all single stage hatcheries but for those in climates that have cool times - even just cool nights - it's a decision that falls in the "no-brainer" category.

**Q: Can any of the improvements be credited to better ventilation systems?**

**A:** Our ventilation systems have not been very highly regarded in the past so the new systems are not only much more energy efficient but also much more in tune with the needs of the overall process. You cannot install a single stage hatchery with the same inefficient room controllers and air distribution systems we got away with before. The birds and the energy are both too valuable to be as wasteful as we were in the past.

**Q: You didn't mention water cooling? Is it necessary?**

**A:** Most certainly. HOOCHO approach requires chilled water. At this point everyone making setters and hatcher acknowledges that water cooling is essential to good bird quality. With the energy management system the water process is a great source of make-up heat as well. Not quite the perpetual motion machine, but pretty close!

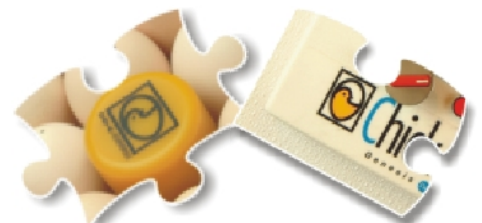
**Q: What advice would you give someone considering a hatchery expansion or refurbishment?**

**A:** Don't even think about multistage equipment for full expansions (wings) or for complete refurbishment. If you already have a multistage hatchery that needs a bit more capacity, fine. But, if you are able to adjust your process to single stage, you must do it.

**Q: No exceptions to that last answer?**

**A:** There are always exceptions. Some parts of the world require small sets, capital for investment is hard to find, labor is inexpensive. Management of any company has to evaluate these factors and decide accordingly. The statement is simply that if you have the ability to go to single stage and the volume required to use the setters as designed, you are most likely making a mistake if you continue to go down the multistage road. Remember how this started. Disease control and traceability. Has the need changed? ☺

**If Spare Parts are a puzzle to you...**



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*and start earning points today.*

*What Causes Early Embryo Mortality? Continued from page 3 column 1.*

Additionally, humidity during egg storage is very important. It should be held at a constant level, usually as recommended for the strain, age of eggs and/or to the company's own standard. Humidity loggers do a great job in measuring any potential problems here. The goal is always to minimize moisture loss during egg storage.

We all know that cracked eggs will not hatch, or at best will have a hatchability drastically reduced. Visible cracks are obvious signs of inappropriate egg handling or poor egg shell quality. Both hair line cracks and tremulous air cells (which cannot be seen), are major issues preventing eggs from hatching.

New data logger products are now under development which can be used to measure shock levels throughout the production chain.

These shock levels have a direct correlation not just to visible cracks, but also to hairline cracks and tremulous air cells. These data loggers can be used from the time eggs are laid through the entire process of egg collection and transport.

## WHAT OTHER TOOLS CAN BE USED TO TROUBLESHOOT AT THE HATCHERY?

Detailed studies of the embryo from oviposition (laying) up to 4 days (96 hrs) of incubation have enabled the sequence of the embryo's development to be accurately staged. Using these studies as a tool, accurate time frames of when embryo mortality has occurred can be established.

With adequate training, hatchery staff can use the stages established in the above studies to pin point the most likely area, then ultimately the most likely cause of early embryo mortality. Corrective action can then be discussed and implemented.

In the early part of the production chain, the hatchery has little or no control of many aspects of hatching egg production. The preservation of the germinal disc, which is a living organism, is very much in the hands of the farms until eggs are collected by the hatchery truck. There are, however, valuable tools available to monitor this part of the process. By using the data generated by these tools, the hatchery can work hand in glove with the farms to help improve the level of embryo viability and therefore improve overall productivity.

We are now ready to look at the ongoing process, looking in detail at hatching egg transportation, delivery to the hatchery and on into egg reception. This will follow in subsequent issues of e-News ☑

### References:

- 1) Management of egg size, egg handling and egg storage. Aviagen
- 2) Factors affecting egg quality and hatchability. Aviagen
- 3) Egg storage temperature. Cobb 500 Management Guide

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David Marsh

## Ask the Eggsperts



Angel Salazar

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

**Q** What basic breeds were used to produce the standard type broiler strains?

*Mrs G. Marchbank - SA*

**A** On the male side the breeds used are the Indian Game/Jubilee Indian Game (giving the dimple breast characteristic). Some heavy strains of New Hampshire Red and the Malay are included, and surprisingly, the White Leghorn is used to introduce the inhibiting gene giving the white feather color. These breeds provide excellent meat and growth characteristics, rusticity, excellent reproductive traits such as fertility and hatchability. This is tempered on the other hand by relatively poor egg laying ability, at pure line, GGP and GP levels.

On the female side the basic breeds used are White Plymouth Rock, (Barred Plymouth Rock), the Light Sussex and the New Hampshire Red. These breeds provide good meat characteristics, coupled with good egg laying ability and excellent reproductive traits.

**Q** What basic breeds were used to produce the modern layer strains?

*Mrs G. Marchbank - SA*

**A** With white egg layers it is two strains of White Leghorn. With brown egg layers it is usually Rhode Island Red on the male side crossed with Rhode Island White on the female side. There are also strains using some Light Sussex on the female side.

## FUN TIME

### The North Carolina Three Kick Rule

A Yankee lawyer went duck hunting in eastern North Carolina. He shot and dropped a bird, but it fell into a farmer's field on the other side of a fence. As the lawyer climbed over the fence, an elderly gentleman asked him what he was doing. The lawyer responded, "I shot a duck and it fell in this field, I'm going in to retrieve it."

The old farmer replied, "This is my property, and you are not coming over here." The indignant lawyer said, "I am one of the best trial attorneys in the U.S. and, if you don't let me get that duck, I'll sue you and take everything!"

The old farmer smiled and said, "Apparently, you don't know how we do things here in North Carolina. We settle small disagreements like this with the NC Three-Kick Rule." The lawyer asked, "What is the NC three-Kick Rule?" The Farmer replied, "Well, first I kick you three times and then you kick me three times, and so on, back and forth, until someone gives up." The Yankee attorney quickly thought about the proposed contest and decided that he could easily take the old southerner. He agreed to abide by the local custom.

The old farmer slowly climbed down from the tractor and walked up to the city feller. His first kick planted the toe of his heavy work boot into the Yankee lawyer's groin and dropped him to his knees. His second kick nearly wiped the man's nose off his face. The barrister was flat on his belly when the farmer's third kick to a kidney nearly caused him to give up. The Yankee lawyer summoned every bit of his will and managed to get to his feet and said, "Okay, you old redneck southerner, now it's my turn."

The old North Carolina farmer smiled and said, "Naw, I give up. You can have the duck."