Chick Master®

e-News

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THE PRINCIPLES OF HATCHERY HEAT RECOVERY
AND ENERGY MANAGEMENT SYSTEMS - PART TWO

The first part of this article in e-News #4 gave you an overview of the new Chick Master Hatchery Heat Recovery and Energy Management System*. This article will look into the operation of the system in a little more detail and gives some examples from various parts of the world of the significant savings in energy costs that can be obtained.

Firstly, it is important to realize that the higher the air volume passing over the primary heat recovery coil the more efficient the coil will be at removing the heat energy returning in the form of warmed 'cooling' water from your incubators. By allowing all of the Hatchery fresh air requirement to pass over the primary heat recovery coil it is possible to increase the air temperature serving all areas of the Hatchery. Consequently the gas or oil energy normally required to heat your incoming air for the complete Hatchery will be substantially reduced.

To achieve the maximum energy savings potential it is essential that the hatchery utilizes one common air intake (man duct). The primary heat recovery coil is installed at the very front of the air intake and all air handling units need then to be coupled to this one common duct. *This is a very important principle of the system as it will maximize the heat recovered from the incubators warm water return line.* However, this is not to say that significant savings cannot be obtained in those hatcheries that receive air from multiple entry points. The savings that can be obtained through retrofit of those systems can be staggering, just not as high as the maximum potential that the single entry common air intake provides.

Another important requirement to maximize hatchery energy efficiency is to utilize your chilled water system so that correctly sized return buffer tanks will allow the process pump to manage the temperature differential between the setter flow and return lines. Your objective is to have the water flowing through the primary heat recovery coil at the highest possible temperature consistent with cooling the setters and hatchers with minimal air flow. The higher the return water temperature from the incubators the higher the air temperature will become as it passes over the primary heat recovery coil.

The heart of the Primary Heat Recovery System is the control system itself. Temperature sensors, water flow sensors and pressure sensors monitor the entire process at all times by constantly analyzing the myriad of control inputs. The control system also manages the frequency drives for the chilled water process circulation pumps, the water flow rate within the system and the control of water flow through the heat recovery system.

The control system also monitors the Primary Heat Recovery and can communicate with ALL other hatchery ventilation control equipment. The Chick Master Galaxy Hatchery Monitoring System has been adapted for centralized monitoring and control of the complete process and can even show water flow rates, valve positions, operating pressures and other energy saving related factors.

How much can the system save in terms of energy?

Typically for every 2kW of cooling energy dissipated, your Water Chiller will consume on average 1kW of electricity. You may recall in part one of this article that we referred to the significant heat energy given out by the developing embryos, energy which now can be utilized through the primary Heat Recovery System, to increase the temperature of the hatchery's incoming air. By reducing the load on your Chiller (and even at some times of the year eliminating the need to run the water chiller at all) we are able to make substantial 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.

It is also worth noting that the system will continue to facilitate energy savings even in the summer months principally 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). Our innovative control system can maximize the warm water return temperature to

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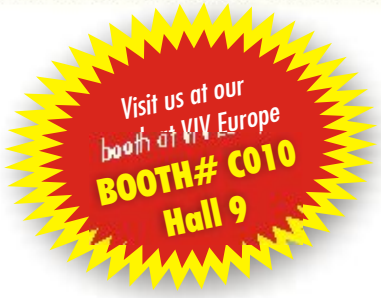

To Our Hatchery Friends:

Incubation methods and procedures have changed dramatically for both single- and multistage systems since the beneficial effects of CO_2 on developing embryos has been appreciated. Eggs today are 10+% larger, on average, than 20 years ago. These changes and others have had a marked effect on how we design modern incubation equipment and have given rise to many ingenious and exciting solutions. Chick Master recognizes the importance of keeping in touch with its' customers on a regular basis, giving you the opportunity to share in new ideas. It is our desire to give you the opportunity to learn how your hatchery can upgrade to the latest technology. In that regard, Chick Master is pleased to announce that this year we are holding an Open House at both our plants, Bridgwater (UK) and Medina (USA).

PLEASE NOTE THESE DATES FOR YOUR CALENDAR

June 7th Chick Master, Bridgwater, UK

September 27th-29th Chick Master, Medina, Ohio

The Open House in Bridgwater, UK, on the 7th June is rapidly becoming fully subscribed as we have limited space available so, PLEASE BOOK EARLY to avoid disappointment.

More details of the Open House in Ohio in September will be announced soon but we can confirm that lectures will be held in both English and Spanish this year.

Hope you find this issue entertaining and valuable. Please feel free to send us your comments, questions or criticisms.

The #1 Upgrade for Classic Systems

*** Payback can be as short as 7 months**

*** Reduces setter energy requirement by up to 23%**

*** 1% Hatch improvement and better quality chicks**

Based on trials in January 2006 by Victor Inostroza Espinoza, Hatchery Manager, Don Pollo, Chile.

Chick Master® e-News

The *Art* of STAGE PROGRAMMING

Part 2: The Delayed Start and Block Pre-Warming Phases

In the previous Chick Master e-News we spoke about the significant impact of the "Step" program on the ability of the single stage hatchery to maximise bird numbers and quality. This second part goes into the detail of the first two stages of the program and explains what they do, how and why they do it, in order to optimise production of top quality chicks from a single stage hatchery.

These stages are shown below and are from a recommended stage program, used in many Chick Master Avida Hatcheries throughout the world.

Stage Number	1	2
Temp Set Point	60.0	80.0
Temp High Alarm	65.0	100.9
Temp Low Alarm	55.0	70.0
Humid Set Point	30.0	30.0
Humid High Alarm	100.0	100.0
Humid Low Alarm	60.0	60.0
Man. Damper Set Point	0.0	0.0
Min. Damper Set Point	0.0	0.0
Damper Mode	MAN	MAN
Cooling Mode	Wet	Wet
Aux Fan On At Damper	40.0	40.0
Aux Fan Auto/Man/Off	off	off
CO2 Set Point	0.0	0.0
CO2 High Alarm	2.0	2.0
CO2 Low Alarm	0.0	0.0
Turning Tilt Time (mins)	60.0	60.0
Level Time (mins)	1.0	1.0
Time in Hours	8.0	5.0
	delayed start	block pre warm

A Chick Master stage program showing the first two steps

STAGE 1 - The Delayed Start Phase

"To keep labor costs down I want to be able to hold my eggs in my Avida Setters, at the recommended egg storage temperature for breed and the age of egg that I have. Then have the ability to start the stage program at a pre-determined time, to commence the pre-warm of my eggs."

This is very often asked by Production and Hatchery Managers and helps to explain the necessity of being able to provide this stage. In many cases this has been prompted by the ever increasing pressure to keep labor costs down in the hatchery in order to increase efficiency. We have been asked this question many times and the answer, is of course, "certainly you can".

The Avida Setter is able to hold the egg pack at the temperature set point, in Stage 1, for as long or as short a period as is required. Once this modification is entered into the parameters for the stage, along with the appropriate temperature set point, then there is no need to be in the hatchery to start the stage program, the Chick Master Genesis IV Control will do it all for you.

Throughout this stage, embryos will be below Physiological Zero, with no cell division taking place. As with Hatching Egg Storage, the viability of the embryo is perfectly maintained, due to the efficiency of the cooling system of the Avida Setter. The damper will remain Closed on a Manual Zero Setting, with the paddle fans turning as normal, therefore maintaining good air movement and very even temperatures within the egg pack.

On the other hand there may be other circumstances involved. For example, short delivery time for eggs, or alternatively where there are the resources and staff available in order to be able to load the Avida Setters and to start the stage program into the Block Pre-Warming Phase, (or Stage 2). It may not, therefore, be necessary to have a Stage 1, in your Program, or at least a short Stage 1. This is perfectly acceptable and adds to the complete flexibility of our system. Whatever works for your own circumstances, is therefore, best for you.

STAGE 2 - The Block Pre-warming Phase

This stage is designed to awaken the embryos from their suspended state, (below Physiological Zero), and to move them onto where cell division will begin. It is advantageous if this is done as evenly as is possible, so that each egg is at a very similar stage of development.

It will be noted by studying the temperature graphs from the Chick Master Galaxy System, that the temperature will

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Hatchery Heat Recovery Systems continued

optimize its heat exchange potential, so as long as the ambient temperature is less than that required by the Hatchery (typically 26°C or 78.8°F) the system will still benefit from significant energy savings.

Now let us look at some examples:
(working on the basis that 1kW-hr of electricity will cost $0.04/kW and 1kW-hr of gas energy will cost $0.035/kW)

Russia - Rostov

Temperature ranging from -25°C (-13°F) in the Winter to +28°C (82.4°F) in the summer. *(Temperature data from the climate station at Rostov from January 2004 to December 2005).*

For a Hatchery setting 1.3 million chicks per week, the calculated electrical and gas energy requirement to heat the incoming air and run the water chillers at the base costs as stated above would be $147,514.00 per year. (Excluding all other energy costs).

With the Chick Master Heat Recovery System installed, it is calculated that a massive 62% of this energy bill could be recovered, representing a saving of over $92,000.

Germany - Leipzig

Temperature ranging from -1°C (30°F) in the Winter to +34°C (93.2°F) in the summer. *(Temperature data from the climate station at Leipzig from January 2004 to December 2005).*

For a Hatchery setting 1.4 million chicks per week, the calculated electrical and gas energy requirement to heat the incoming air and run the water chillers at the base costs as stated above would be $109,844 per year (Excluding all other energy costs).

With the Chick Master Heat Recovery System installed, it is calculated that a massive 61% of this energy bill could be recovered, representing a saving of over $67,000.

USA - Missouri

Temperature ranging from -14°C (6.8°F) in the Winter to +32°C (89.6°F) in the summer. *(Temperature data from the climate station at Springfield from January 2004 to December 2005).*

For a Hatchery setting 790,000 chicks per week, the calculated electrical and gas energy requirement to heat the incoming air and run the water chillers at the base costs as stated above would be $72,000 per year. (Excluding all other energy costs)

With the Chick Master Heat Recovery System installed, it is calculated that 50% of this energy bill could be recovered, representing a saving of over $36,000

** If you did not receive Chick Master e-News #4 you can download it for free from www.chickmaster.com*

Chick Master e-News

Save the date!

Open House 2006
Medina, Ohio, USA
Sept. 27th-29th

FUN TIME

A life-long city man, tired of the rat race, decided that he was going to give up the city life, move to the country, and become a chicken farmer. He found a nice chicken farm which he bought. It turns out that his next-door neighbor was also a chicken farmer. The neighbor came for a visit one day and said, "Chicken farming isn't easy. Tell you what. To help you get started, I'll give you 100 chickens." The new chicken farmer was thrilled. Two weeks later, the neighbor stopped by to see how things were going. The new farmer said, "Not too good. All 100 chickens died." The neighbor said, "Oh, I can't believe that. I've never had any trouble with my chickens. I'll give you 100 more." Another two weeks went by, and the neighbor stopped in again. The new farmer said, "You're not going to believe this, but the second 100 chickens died too." Astounded, the neighbor asked,"What did you do to them? What went wrong?" "Well," said the new farmer, "I'm not sure. But I think I'm not planting them far enough apart."

The Art of Stage Programming Part 2 - continued

actually reach set point, before this stage has elapsed, therefore allowing all the eggs in the egg pack time to reach this first temperature plateau. If this portion of the program is done in this manner, then it will help in the quest for as narrow a hatch window as possible, aiding chick uniformity and quality.

This objective is achieved during this phase when the temperature set point is raised from the egg storage temperature (which is pre-determined by the hatchery, taking into account the age of eggs, breed, and in some circumstances company policy) to 80°F (26.7°C), in order to raise the internal egg temperature above Physiological Zero.

"How long will this take?", would be one obvious question. To answer this in a few words is difficult, but we do have the tools in order to answer this, contained in our Chick Master Egg Warm Up Time Calculator.

"What inputs does this Calculator require in order to accurately predict the length of time required in Stage 2?", again another very good question and can best be answered by logging on to www.chickmaster.com, in order to obtain your own Chick Master Egg Warm Up Time Calculator. You will note additionally that it can also be used in the same way, in order to accurately predict the time required in the next Phase, i.e. Block Warming Phase, or Stage 3.

We are now progressing from the beginning of the Step Program, through the first two Phases and have managed to bring the embryo from a suspended state of 40-50,000 cells, to a blastoderm. Which will be somewhere in the region of 500,000 cells, at the end of Phase 2. We are now ready to start very rapid cell division, which takes place in Phase 3 and will be explained in detail, in subsequent e-News articles to follow

David Marsh

Ask the Eggsperts

Angel Salazar

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

Q I keep the humidity in the setter corridor at the same RH year round but for some reason I have trouble getting the proper weight loss in the summer months. Why?

P.K. - Turkey

A *Due to the higher ambient RH in the summer, it would be advantageous to change your stage program so that the setter dampers are in Auto Humidity Control, in order to allow the control on your setters to react to the changes in ambient RH value. As a general rule, weight loss should be 10.5% at 18.5 days, derived from an average of 56% RH during incubation. The problem of insufficient egg weight loss is that it will affect hatch and chick quality, plus farm performance negatively.*

Q My hatchers are a bit on the old side (25 years). They performed well in the beginning but lately they are having more and more trouble staying cool enough. Is this a mechanical problem that can be corrected or is something else going on?

J.N. - South Africa

A *No, this is not likely to be a mechanical problem. Rather, it is probably connected with the fact that the 2006 variety of high yielding broiler is totally different to the broiler of even 3-5 years ago. Remembering that 30% or more of the growth of these new breeds takes place during incubation and hatching, it is not surprising that without a considerable increase in cooling capacity a hatcher, or for that matter a setter, that was sold 25 years ago would be experiencing difficulty in coping with the heat load generated during the incubation/hatching process. You need to upgrade your cooling system.*

Please send your "Ask the Eggsperts" questions to: asktheeggsperts@chickmaster.com

A FINAL THOUGHT...

"The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them" Sir William Bragg - physicist

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

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