

The *Art* of

STAGE PROGRAMMING

Managing Temperature and Humidity for Optimum Production

The use of stage or "step" programming in incubation is an art form that should be appreciated for its potential to significantly impact both hatch numbers and bird quality. Despite the generally accepted fact that the environmental needs of the fertile egg change as the embryo develops, most of the industry is still using a multistaging approach to setting eggs. While multistaging continues to be an accepted approach to egg hatching, it does limit the functioning of the setter to a series of three- or four-day cycles continued into theoretical infinity. The principal shortcoming to multistaging as you have read in this newsletter many times before is that the 1 day old embryo and the 18 day old embryo must co-exist in exactly the same conditions. The eggs may co-exist, but the resulting truce is hardly beneficial to either!



Genesis IV Control - ideal for controlling and modifying stage programs

The single stage setter has no such compromises to function within. The conditions in the setter are only limited by the physical capabilities of the equipment and the resourcefulness of the person controlling the program. There is no absolute requirement for the setter control to make adjustments to the set points for temperature and humidity without human intervention, but the practicalities of the process make it as near to essential as it can be without being

absolute. In order to produce the best possible product for the hatchery, the process must:

- Maximize the number of birds hatched;
- Minimize the number of second quality chicks;
- and... Produce the required chicks on time;

Every hatchery has the same objectives, but the multistage operator is constantly forced to make choices that may benefit one of these objectives at the expense of the other. The single stage setter with a control capable of step programming reduces that trade-off almost to the point of elimination. For example, among the many capabilities of Chick Master's Genesis IV Control, we have the ability to do;

- Delayed Start Phase
- Block Pre-Warming Phase
- Block Warming Phase
- CO₂ Concentration Phase
- Automatic Damper at High Humidity Phase
- Automatic Damper with Low Humidity Phase
- Temperature Reduction Phase
- Cooling Phase

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To Our Hatchery Friends:

Every new year brings challenges requiring new and ever ingenious solutions and new expectations from our customers that need to be met with spirit and enthusiasm. 2006 will be no different in the world of Chick Master.

Those of you who visited our booth in Atlanta saw some of the exciting new products and services that Chick Master has to offer. The new trolley based multistage RollMaster II setters, the new GeM control system, the high visibility Central Alarm system and our Humidity Dataloggers are just a few of the new products available. You will be hearing about these and many more exciting products as the year goes by.

Our patent-pending system of heat recovery and energy conservation systems for hatcheries is raising a lot of interest within the industry. The prospect of vastly reduced energy bills by utilizing the spent heat energy from the developing embryos is an opportunity that is difficult to resist for hatcheries in virtually any climate in the world. This issue of e-News contains the first of a number of articles that will highlight various aspects of Chick Master hatchery heat recovery systems.

Our HOOCHO bird has now been seen throughout the world and is the symbol that embodies our incubation philosophy; water cooling (H₂O) and CO₂ management. All systems, single or multistage, can benefit from HOOCHO for improved chicks and significant energy saving - ask for details how.



Hope you find this issue entertaining and valuable. Please feel free to send us any constructive comments or criticisms. *We can take it!*

THE PRINCIPLES OF HATCHERY HEAT RECOVERY AND ENERGY MANAGEMENT SYSTEMS

The main principle of the system is to recover spent embryonic heat and efficiently manage the hatchery cooling system

Firstly it needs to be recognized that Hatcheries are significant producers of heat energy. Through the incubation of chicken eggs very large amounts of embryonic heat is produced that will in turn require water chillers to remove it. As an example, a Hatchery producing just over three million chicks per week will give out 1100Kw of heat energy. In a typical installation this heat would be removed by two or more water chillers. However,

since the heat given off by the eggs and chicks is basically constant these chiller units will be working 365 days a year, winter and summer. A common situation that often arises during winter is that the hatchery is using electrical energy to remove heat from the chilled water system, then using gas energy to place heat into the supply air - while disposing of the heat it paid to remove from the water! The result is high energy bills, higher equipment maintenance

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The Art of Stage Programming continued

Each of these phases of incubation is definable both in time and purpose. The absolute values assigned to each phase will vary slightly under unusual hatchery conditions (high altitude, very humid or dry supply air, very young/old flocks, very fresh/old eggs, etc), but we have found that the primary reason they will change is to meet the time objectives of the hatchery. Proper definition of these phases (with the help of some simple tools available to you from Chick Master) will allow the single stage hatchery manager to improve quantity and quality of the hatch while ensuring that the hatch is on time!

The true value of the stage program can be summed up in a few words; it allows you to simultaneously manage humidity (the key to bird quality) and temperature in terms of the correct degree hours (the key to hatch quantity and timing).

With a stage program you can hold high humidity during the critical early stage of the set which carries with it the equally important CO₂ concentration. The high humidity/CO₂ combination maintains the quality and viscosity of the albumen which in turn allows efficient transfer of the calcium ions and other trace minerals from the shell and albumen to the developing embryo. Then, as the embryo begins its rapid growth phase the stage program provides an environment that encourages the egg to rapidly evacuate the water from its depleted residue of albumen.

Meanwhile, the temperature profile in the setter is gradually reducing to allow the air passing over the egg to remove more and more heat with each pass. Since the heat profile of the developing embryo is known, the required volume and temperature of the air necessary to take the excess heat

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Hatchery Heat Recovery and Energy Management Systems continued

and all of your expensive heat energy being exhausted through your roof into the environment!

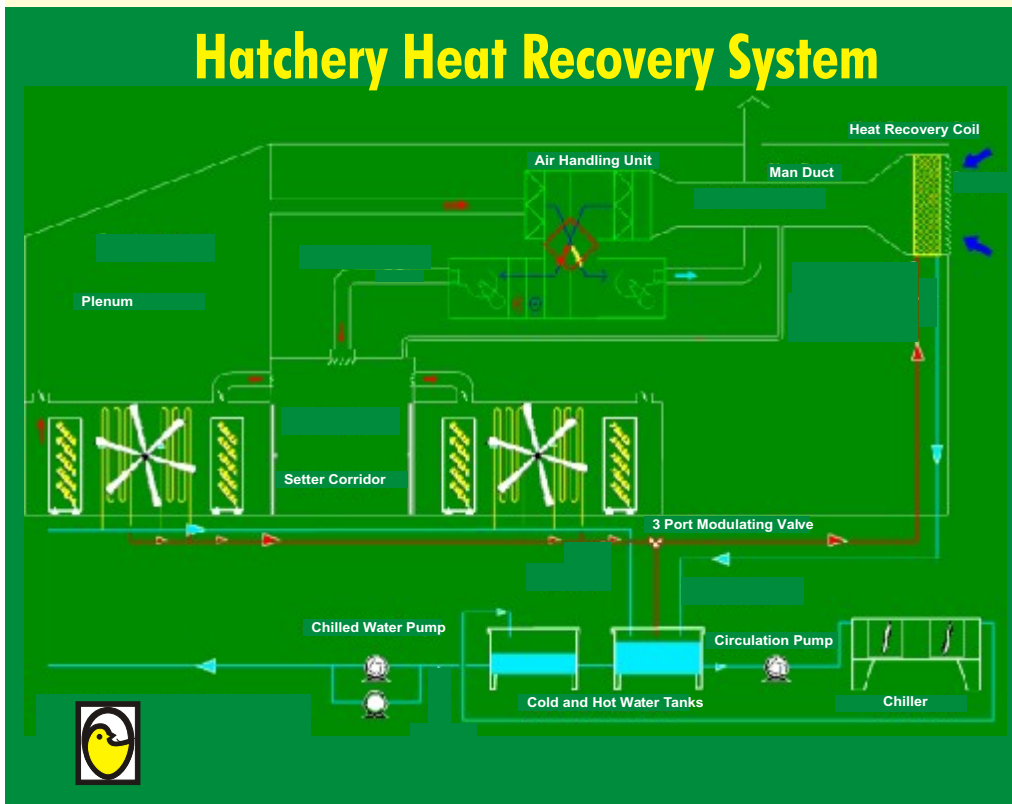
Taking this into consideration, Chick Master has taken the initiative to develop a system that will recover the heat from the developing embryos and recycle it to heat the incoming air into the hatchery. This is achieved by removing the heat from the warmed water cooling return line by using a heat recovery coil through which the warm water is channelled while passing the incoming cold air over the coil. The result is a double benefit since we not only have warm incoming air that requires little or no extra heating, but the warmed water in the heat exchanger now returns to the chiller colder. Not only are we saving valuable gas or oil energy for the heating of the incoming air, but we are also saving valuable electrical energy from the much reduced or virtually eliminated use of the water chillers. This form of heat recovery is known as Primary Heat Recovery and is responsible for the major share of heat energy recovered and electrical energy saved.

In addition to the heat recovered from the primary source, a secondary source of heat recovery can be found in the exhausted air from the setters (there is also heat energy available from the hatcher exhaust which is considered to be unusable due to the high levels of contamination from chick fluff and other contaminants). This is known as Secondary Heat Recovery. It is also extremely valuable mainly due to the fact that setter exhaust air is typically around 36°C (about 97°F). *Note: Heat recovery made from the setter exhaust air carries absolutely no danger of cross contamination since our system uses fixed plate heat exchangers totally separating the supply air from the exhaust air.*

When outside temperatures are close to freezing the primary heat source would raise the incoming air temperature to approximately 18°C (65°F). The air-to-air heat recovery system would then play its part in the process by raising that warmed air even further, potentially up to the target temperature for the setter room air supply. All this without using gas or oil to provide the heat!

It has to be remembered that this level of recovered heat utilization is only available where air to air heat recovery is possible. Nevertheless the example above demonstrates that in many parts of the world it is possible to raise the temperature of ambient air at freezing point all the way to 25°C (77°F) purely from 100% recovered heat energy! 


THE PRINCIPLES OF THE CHICK MASTER HATCHERY HEAT RECOVERY SYSTEM SCHEMATIC DIAGRAM OF A TYPICAL SYSTEM



Top right is the heat recovery coil through which warmed 'cooling' water from the setters is passed. Fresh incoming air passes over the warmed coil to provide recycled heat for the hatchery rooms. Heat exhausted from the setters is also used to further warm the incoming air in the air handling unit.

The Art of Stage Programming continued

away can also be determined. With these factors defined, the temperature profile can be defined and downloaded into the stage program.

In subsequent editions the Chick Master e-News we will discuss each of the control phases in more detail, including the purpose of each phase, the conditions under which you would or would not choose to use the phase, and the suggested settings and time durations of each of the phases 

FUN TIME

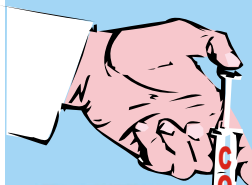
A man was driving his truck down a country lane, when suddenly a chicken darted out into the road in front of him. He was just about to slam on his brakes to avoid the chicken when he realized that the chicken had sped on ahead doing about 30 miles per hour. Amazed, he sped up to follow, but the chicken took off faster and faster. Finally the chicken screeched into a turn and went into a small farm. As the man turned to follow, he noticed that the chicken had THREE legs. He stopped in front of the farm house, and looking around, noticed that ALL the chickens had 3 legs. He said to the farmer "THREE-legged chickens? That's astounding!" The Farmer replied "Yes, I bred them that way--I love drumsticks." So the man asked "How does a 3 legged chicken taste?" The farmer replied "I don't know. I haven't been able to catch one yet."

Genesis M Control

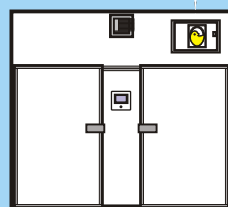


Designed for multi-stage two zone setters and the associated hatcher. The GeM is a brilliant and valuable tool for efficient operations using PLC controls from Rockwell Automation.

CO₂ Injection System



for Avida systems



Chick Master has developed this process to allow embryos to gain the benefit of raised CO₂ levels in the early days of incubation.

Raised CO₂ levels promotes a better hatch and better chick quality. On the farm, these birds have improved feed conversion ratios due to lower mortality and rapid attainment of kill-weight.

A triple winner for you!

A FINAL THOUGHT...

"It is common sense to take a method and try it; if it fails, admit it frankly and try another. But above all, try something"

Franklin D. Roosevelt

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

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Ask the Eggsperts



David Marsh



Angel Salazar

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

Q

How important is an increased concentration of CO₂ 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 CO₂ 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 CO₂ injection system, this can be achieved very easily, resulting in improved chick numbers and quality.

Q

I always heard that target weight loss at transfer needs to be 13-14% of initial egg weight, but CM is recommending 10.5%. Why the difference??

M.H. - USA

A

Because increased CO₂ levels promote greater skeletal and organ growth which allows the embryo to absorb more of what used to be waste materials and waste water. What used to be tray residue and humidity going out the roof is now inside the bird!

Please send your "Ask the Eggsperts" questions to us by replying to this e-News email.

Save the date!

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