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Embryo Shell Temperature

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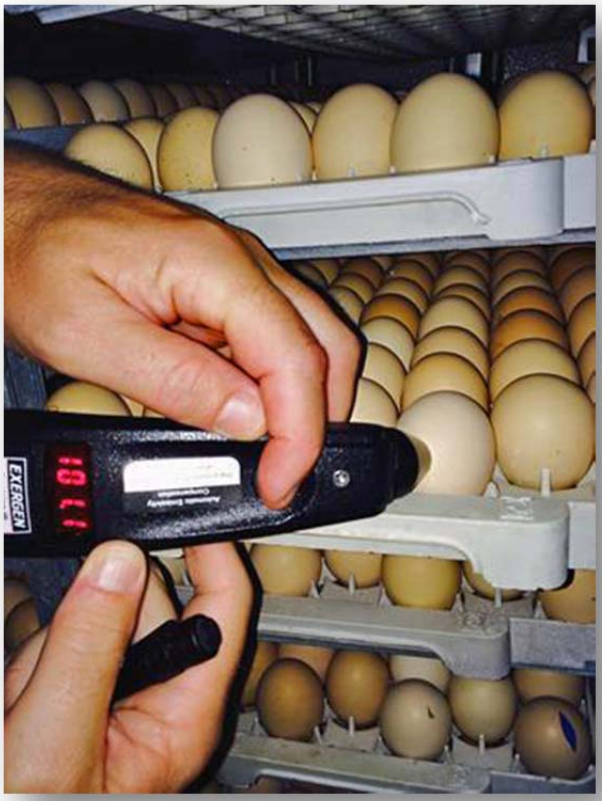
Why is measuring embryo shell temperature (EST) so important?

Not only does it improve your hatchability, but there are numerous studies indicating that proper management of embryo shell temperature also leads to improved 7 day mortality, feed conversion and overall broiler livability.



The EST is where the temperature of the embryo is recorded during intervals of incubation to help maintain proper embryo development. This measurement is used extensively in Single Stage incubation equipment, but it can also be used in multi-stage incubation equipment for achieving the same prescribed outcomes. The temperature if too cool or too warm can influence the outcome of the hatch percent and chick quality. This temperature should be monitored to help improve overall performance of the chick while in the incubation process. In the table below, there are various consequences that arise when your EST is not at the ideal level:

Recommendation:

To obtain maximum hatchability and optimal chick quality, the ideal EST is between 100.0 – 101.0 Fahrenheit. **This recommendation is for multi-stage incubation equipment only.**

TEMPERATURE (°F)	CLASSIFICATION	CONSEQUENCES
98.0°- 99.9°	Too Cool	Slow & Depressed Hatch
100.0°- 101.0°	Ideal	Good Hatch & Quality
101.1°- 102.0°	Too Warm	Good Hatch & Compromised Quality
102.1°- 104.0°	Very Warm	Poor Hatch & Quality

In addition to hatchability, EST can also affect the performance of the broiler. The table below indicates the positive and negative effects that EST has on broiler performance:

CRITERIA	LOW TEMP	IDEAL TEMP	HIGH TEMP
Hatchability	Very Bad	Very Good	Good
Hatch Window	Very Bad	Very Good	Bad
Cull Rates	Very Bad	Very Good	Good
Chick Yield %	Very Bad	Very Good	Bad
Early Mortality (up to 21 days)	Very Bad	Very Good	Good
Late Mortality (over 21 days)	Very Good	Very Good	Very Bad
FCR	Good	Very Good	Very Bad
Carcass/Breast Meat Yield	Very Bad	Very Good	Good
Navel Quality	Very Bad	Very Good	Bad/Good
Heart Size	Very Good	Very Good	Very Bad
Broiler Weight (up to 21 days)	Very Bad	Very Good	Good
Broiler Weight (over 21 days)	Very Good	Very Good	Very Bad
Leg Culls	Very Good	Very Good	Bad
Colibacilliosis	Bad	Very Good	Very Bad

By monitoring the EST, it can help determine the appropriate incubator temperature and humidity, set times, transfer time. Using EST can also help maintain the optimum conditions for embryos in a multi-stage environment.

When do I measure the EST and how do I do it?

The best time to record the EST is twelve hours before transfer and again just before transfer. The EST increases rapidly in the final stages of incubation before transfer. If the temperature is too high in specific locations in the multi-stage incubator, this could indicate mechanical inefficiencies or improper balance of egg setting procedure.

The EST should only be recorded from a live embryo. To ensure that the egg has a living embryo, use a flashlight to candle the egg.

The device for measuring the EST (embryo shell temperature) should be a thermal surface thermometer or infrared thermometer. These devices come in a variety of accuracy ranges and price ranges. It is important to use the same device to insure day to day accuracy and overall competence in the data collected. Below are examples of thermometers used to record EST.

When measuring EST, it should always be done in a precise and accurate manner. A one hour window is recommended on time and day for these recordings. It is important that a consistent set of procedures are put in place to record these temperatures. By doing so, this ensures that the most accurate information is being monitored and recorded. The correct position for recording this temperature is on the equator of the egg.

Things to Remember:

The recording of these temperatures should be captured in order to evaluate the information later.

This information can be analyzed by: machine hallway and specific hatch day.

It is imperative to collect the information consistently so that more data is available for evaluation when needed.

How do I measure EST in my multi-stage incubator?

Here are some specific instructions for recording this temperature in the most common multi-stage incubation equipment.

In a Chickmaster multi-stage fixed rack system, the best results are from temperatures taken in **six** different locations throughout the machine. The location of the recordings for EST should be as follows:

- Front left close to the entry door
- Middle left by the post
- Back left
- Back right
- Middle right by the post
- Front right close to the entry door

In each of these locations, it is important to record the temperatures in the top, middle and bottom position of the rack. It is suggested that you record **five** viable embryos per location. This includes five eggs per egg flat and 15 per location (90 embryos per machine).

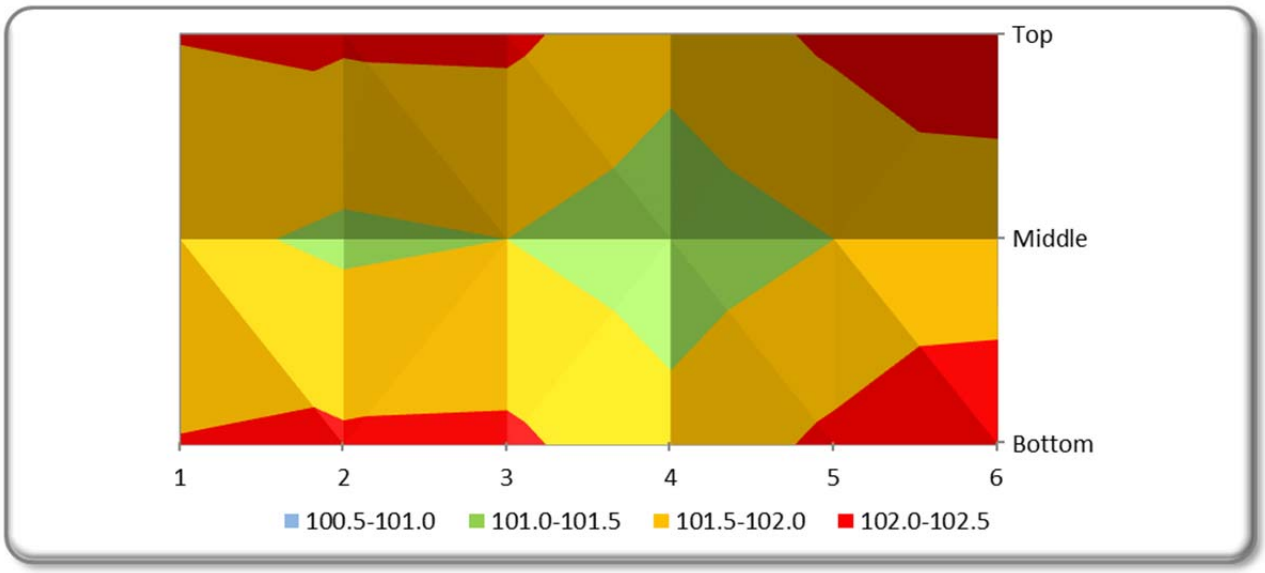
When this exercise is performed, the ideal egg to record the temperature is from the middle of the egg flat. This egg is less influenced by air movement in the machine and will give the truest temperature indication. It is recommended to pull the flat of eggs out and record the temperature from near the center of the egg pack in this specific row of eggs

In a Jamesway multi-stage tunnel machine, the location of the recordings for the EST should be as follows:

- Second tray position from the top, on the left side
- Second tray position from the top, on the right side
- Eighth tray position from the top, on the left side
- Eighth tray position from the top, on the right side
- Fourteenth tray position from the top, on the left side
- Fourteenth tray position from the top, on the right side

We take temperature recordings from the left, middle and right side of each location. The number of embryos per specific location is five recordings. This will include 15 recordings per row, 45 per setter trolley and 90 per machine. To obtain these recordings, it is important to separate the fifth and sixth position while still in the incubator. This location can be reached by pushing the sixth position forward and then recording the temperatures once in between the fifth and sixth position. These eggs in the sixth position will hold the warmest temperatures for embryos in the machine. When the use of a single curtain in the incubator is being used, then this location is very difficult to achieve. The middle column in the setter trolley can be recorded in the same manner. This location will provide slightly lower temperatures (.1 - .3 less than the normal). It is still important in this location to pull the egg flat out and use the embryos in the middle of the egg pack.

When all of these recordings have been completed, it is important to document them in a database, chart or system of your choosing. In the diagram below, the database used provides a diagram of the setter and the differing heat patterns found throughout the machine. This is excellent for isolating mechanical issues and trying to keep the machine balanced with heat load.



Conclusion

The use of recording EST in a multi stage environment will help to improve the overall hatchability and chick quality. This practice is a vital tool to helping monitor the performance of a hatchery. The information from this procedure will indicate actions or specific locations that need to be addressed by machine or hallway. It can also help to denote when the proper time for setting and transferring eggs should occur. The practice of using EST to help improve hatchability and chick quality can improve performance in the hatchery.

For more information, visit:
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