

# An optimal start of the incubation process improves hatchability

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**Storage of hatching eggs is a common procedure at breeder farms and hatcheries. Normally, commercial hatcheries set their eggs after 3 to 5 days of storage to minimize the negative effect of egg storage on hatchability and chick quality. However, due to the variations in the supply of hatching eggs and market demand for day-old chicks, hatcheries sometimes need to increase the storage duration.**

It is well known that an increase in storage duration increases hatch time and decreases hatchability, hatchling quality, and subsequent performance, and increases posthatch mortality. The research department of HatchTech showed that the decrease in hatchability of 0.93% per storage day when storage duration increased from 3 to 14 days is mainly caused by an increase in embryonic mortality from days 0 to 9 of incubation.

## **Preincubation warming profile**

In practice, eggs are warmed from the storage temperature to the incubation

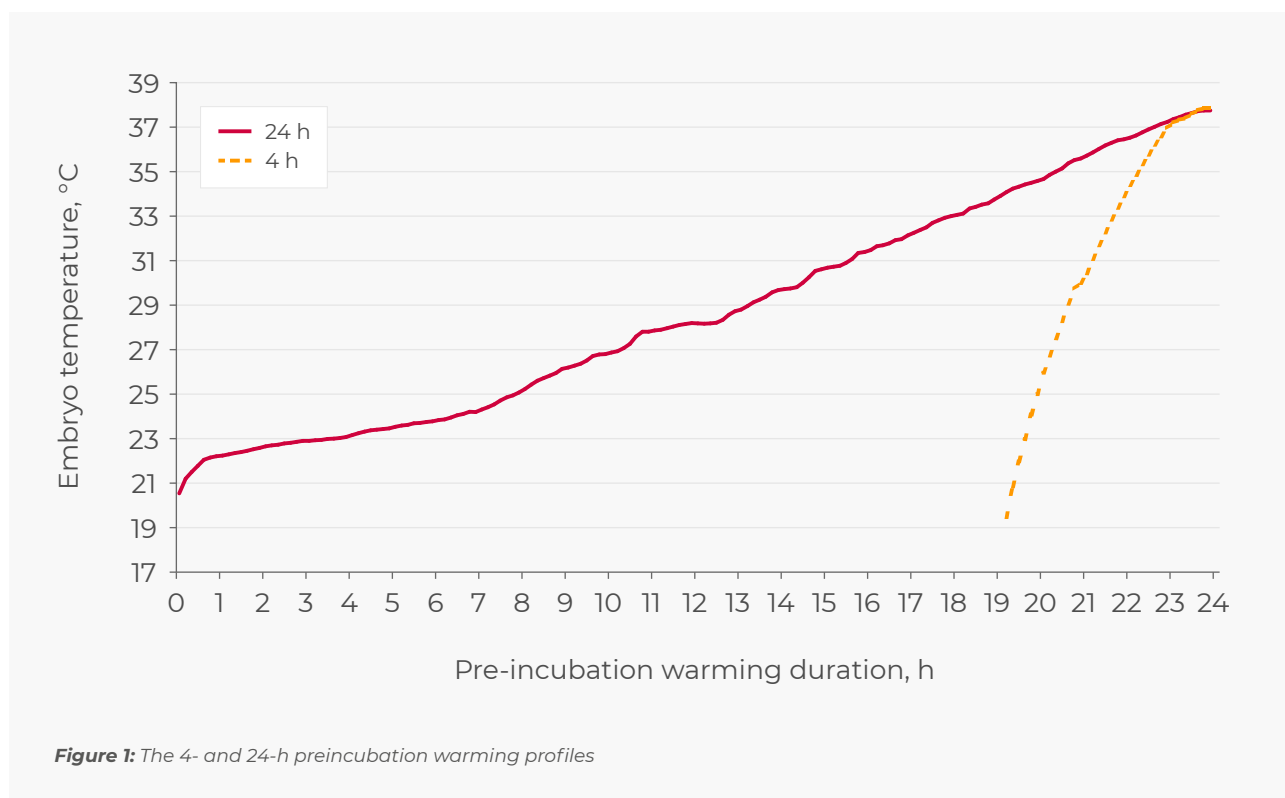
temperature in a way to prevent condensation on the eggs, which minimizes bacterial contamination of the egg and embryo. But it is unknown what the direct effect is of the preincubation warming profile on early embryonic mortality. It is possible that the high percentage of early embryonic mortality in long-stored eggs is related to the preincubation warming profile that is used to warm eggs from the storage temperature to the incubation temperature. The optimal preincubation warming profile may differ for short- (< 7days) and long-stored eggs (> 7days) because embryos of longstored eggs are more sensitive to

temperature changes than embryos of short-stored eggs. Therefore, the research department of HatchTech investigated whether long-stored eggs require a slower preincubation warming profile than short-stored eggs.

### A slow preincubation warming profile improves hatchability of long-stored eggs

In two experiments, two storage durations and two preincubation warming profiles were used.

The preincubation warming profile did not affect early embryonic mortality in the short-stored eggs (4 days) in none of the two experiments. However, in both experiments, embryonic mortality during the first 9 days of incubation decreased in long-stored eggs when the 24-h preincubation warming profile was used instead of the 4-h preincubation warming profile (Table 1). In both experiments this decrease in early embryonic mortality resulted in an increase in hatchability.



In experiment I, storage durations were 4 and 14 days. In experiment II, storage durations were 4 and 13 days. In both experiments, eggs were warmed within 4 or 24 hours from 19.0 to 37.8°C, which is the embryo temperature for optimal development (Figure 1). In experiment I, a prime breeder flock was used and in experiment II a young breeder flock was used. Storage temperature was 18°C in both experiments.

The embryos that survived early incubation were of good quality and were able to hatch as a good quality chick.

Storage duration (days)	Preincubation warming profile (hours)	Embryonic mortality between days 0 - 9 (% of fertile eggs)	Hatchability (% of fertile eggs)
<b>Experiment I</b>			
4	4	5.8	93.3
4	24	4.8	93.3
14	4	9.9	88.1
14	24	5.5	94.6
<b>Experiment II</b>			
4	4	5.3	92.7
4	24	5.2	93.5
13	4	23.2	73.2
13	24	18.8	78.9

**Table 1:** The effect of storage duration and preincubation warming profile on embryonic mortality between days 0 and 9 and hatchability

We can conclude that the 24-h preincubation warming profile reduces early embryonic mortality in long-stored eggs and increases hatchability of good quality chicks. It seems that the survival rate of long-stored embryos increases when embryos develop slowly at the start of the incubation process.

**Uniform Embryo Activator™**

Based on this knowledge, HatchTech developed the Uniform Embryo Activator™, which is a standard feature of the HatchTech MicroClimers Setters. When the Uniform Embryo Activator™ is used, eggs can be placed directly from the storage room into the setter. The air temperature increases with small steps to the incubation temperature setpoint according to a programmed profile. The combination of the Uniform Embryo Activator™ and the HatchTech MicroClimer

laminar airflow technology ensures that the egg temperatures increase uniformly at the start of the incubation process and that embryo development proceeds uniformly which minimizes the hatchwindow and improves chick quality. This is a benefit for short- as well as long-stored eggs.

The Uniform Embryo Activator™ controls the first incubation phase and ensures the best and most uniform start of embryonic development of all the embryos in the setter. Another benefit is that this feature enables the hatchery manager to program the optimal preincubation warming profile according to the background of the eggs, such as storage duration, to maximize hatchability.

*Source: International Hatchery Practice 26:3*