Understanding how to preserve hatching egg quality

Once the egg has been laid, we can only preserve its quality, or its hatching potential, and nothing more. Therefore, after oviposition, egg quality cannot be improved, it can only be either preserved or it can deteriorate. To preserve hatching egg quality, several requirements should be met, and this article will go through the main requirements to preserve hatching egg quality.

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On the farm, eggs go through four main steps – oviposition, collection, disinfection, and storage. For each step, some requirements need to be considered to preserve the egg quality.

Recommended temperature on the farm

At the time of oviposition, the fertilised egg contains an embryo at a developmental stage of IX or X with around 40,000-60,000 differentiated cells. This embryo could continue its cell multiplication when exposed to a temperature at or above the physiological zero (12-20°C/63-70°F). The breeder house temperature is recommended to be between 21°-25°C (70-77°F).

This temperature is often higher, especially during hot weather, and much higher in the nests, especially when occupied by a hen. Under these conditions, temperature can be sufficient to initiate a minimum level of embryo cell multiplication.

Therefore, eggs must be regularly collected and cooled down to storage temperature to slow down pre-incubation and embryo development. That is why a frequency of at least four egg collections per day is recommended.

In addition, at oviposition, the egg will have a temperature near to the hens' body temperature which is around 41°C (106°F). This means that it would take several hours before the internal egg temperature reaches that of the breeder house temperature. This fact, especially in hot weather, increases the risk of a continued cell multiplication and development after oviposition.

To avoid this risk, laid eggs should be cooled within four hours to 24°C (75.2°F) and then held at the optimum temperature for the expected period of storage in the farm.

Storage conditions on the farm

Generally, storage conditions on the farm are not always well controlled due to the complex management process and especially when, in some cases, there is only one storage room for more than one breeder house. However, some basic requirements related to the temperature, the humidity, the air flow, and the biosecurity should be implemented and controlled.

Usually, eggs are stored on the farm for between one to four days at a temperature between 19-22°C (66-72°F) as is often recommended for the eggs' storage, with an industry average of 20°C (68°F) being applied. When the storage temperature at the farm is determined, the egg transportation temperature and conditions should also be considered.

In fact, the temperature applied to the eggs from the time of oviposition to the initiation of the incubation process should be gradually decreased.

This means that the temperature of eggs storage at the farm should be equal to or slightly higher than the temperature of egg holding in the transportation truck with the hatchery egg holding room temperature being the lowest setting. This will avoid stimulating the cellular division by a preheating process.

For better stability of the temperature inside the egg storage room on the farm, an air curtain can be installed in the room entrance.

This tool will minimise the exchange of heat between the inside and the outside of the storage room as eggs and trolleys are moved in and out of the storage room.

Additionally, stir or mixing fans should be added in the egg storage room to create a more uniform storage environment. Checking

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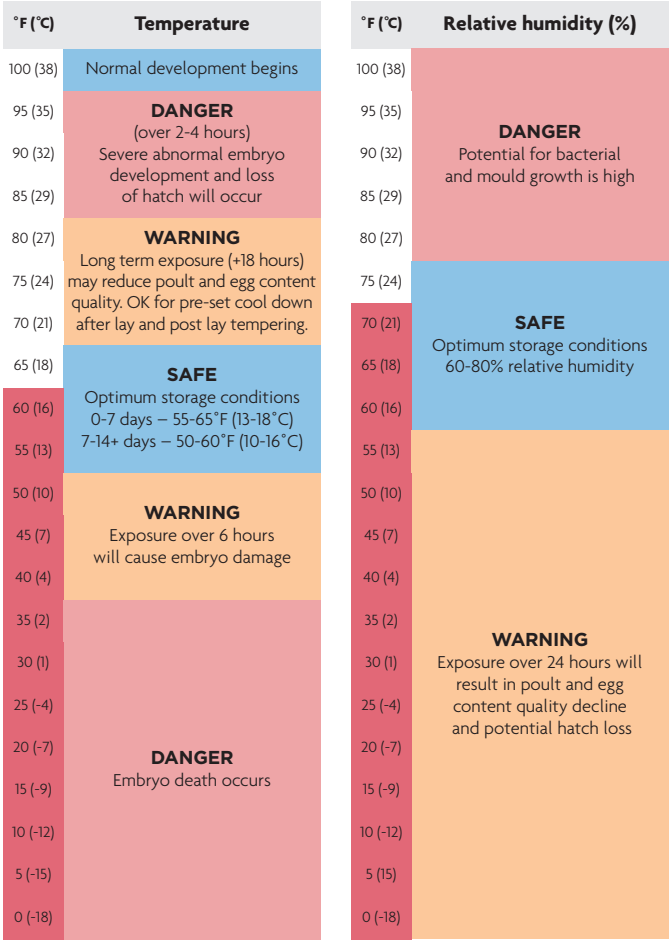

Fig. 1. Hatching egg storage room recommendations.

Table 1. Embryo development during storage. Diameter of the germinal disc in mm by storage time.

Storage time (hours)	Temperature (°F)				
	75	80	75	90	100
24	4.96	5.44	6.01	7.41	12.29
48	4.78	6.08	10.19	15.48	–
72	4.87	6.54	16.68	28.23	–
96	4.86	9.13	22.63	38.96	–

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storage conditions within the storage room at numerous different places will help to determine if there are any warm or cool spots in the egg room which should be avoided.

Humidity during storage should be maintained between 60-80% relative humidity to avoid a loss of egg moisture.

During transportation

Transportation conditions can also impact the egg quality and subsequent hatchability and chick quality.

The temperature should be controlled during the transportation and maintained lower than the farm storage temperature, but higher than the egg storage temperature in the hatchery.

This should be monitored with the use of temperature data loggers held in the transportation truck and the truck temperature measured upon arrival at the hatchery.

During transportation, rough handling should be minimised as this will affect egg quality. This can be the result of sudden starts and stops, bumpy roads and poor suspension in transportation trucks.

Trucks with a good suspension system can help to decrease the impact of excessive jarring on eggs due to rough roads.

An acceptable low speed, especially in difficult road infrastructures, can also help to decrease the intensity of jerks and jarring on hatching eggs.

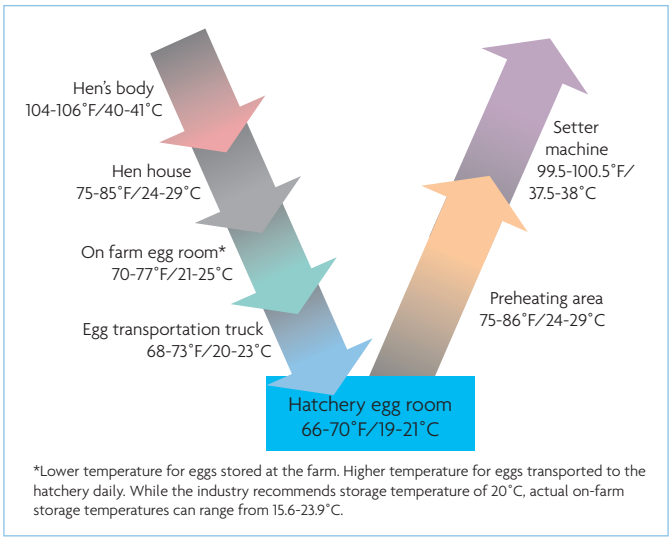

Fig. 2. Egg temperature flow chart (for fresh eggs).

In the hatchery

In the hatchery, egg storage duration can be more than seven days depending on the internal company management and the hatchery egg markets and demand.

Egg storage parameters that should be mastered in the hatchery are the same as on the farm. However, the ideal temperature will be varied according to the length of egg storage.

Egg storage for less than seven days is considered a short storage period; and an egg storage period exceeding seven days is considered a long storage period, which will result in decreased hatchability relative to the length of storage. It is well understood that long storage duration will have a negative impact on hatchability due to an increase in embryo mortality especially at the early embryonic stage.

The humidity is also an important parameter to consider. With long storage duration there is a tendency to increase the egg room humidity to minimise the loss of the moisture of the egg during storage.

For big hatcheries with egg storage rooms that are rarely empty, it is hard to apply regular disinfection to these rooms.

In this case, a disinfection by fumigation using an authorised product is recommended. ■

References are available from the author on request

Table 2. Temperature and humidity of egg storage by storage time.

Days	Temp. (°F)	Temp. (°C)	Humidity (%)
1-3	64-70	18-21	70-75
4-7	59-64	15-18	70-75
7-13	54-59	12-15	75-80
>13	54	12	75-80

Advice

In both egg storage rooms on the farm and in the hatchery, it is recommended to adhere to the following points:

- Avoid egg temperature instability or variations. Research indicates that variations in on-farm egg storage temperatures of as little as 2°F can reduce hatchability by as much as 3.5%.
- The temperature in the storage room should be homogeneous. To help this, space should be kept between eggs trolleys for circulation. Eggs trolleys should also be kept around 10cm from the wall.
- Once eggs enter the storage room, they should not be removed until they are loaded on the egg transportation truck. Do not move partially full trolleys back into the egg work room.
- To cool eggs using an air-conditioner, avoid the cooling air coming in directly on the eggs. Eggs receiving air directly from the cooler will have a lower temperature than other eggs. This fact will result in a late hatch of these eggs compared to the rest of the eggs.
- Avoid condensation on the eggshell as it can cause the contamination of eggs. A gradual decrease of the egg temperature when going from one area to another can help reduce egg sweating.
- Conditioned air should be clean to avoid egg contamination. Regular cleaning and changing of air filters in air conditioning units is necessary.
- In case of the use of humidifiers to maintain the humidity in the storage room in the farm or the hatchery, water should be sprayed in a fine mist. Those nozzles should be cleaned regularly and changed when needed. The bacteriological quality of the water should also comply with standards. A regular control of the bacteriological water quality is necessary.