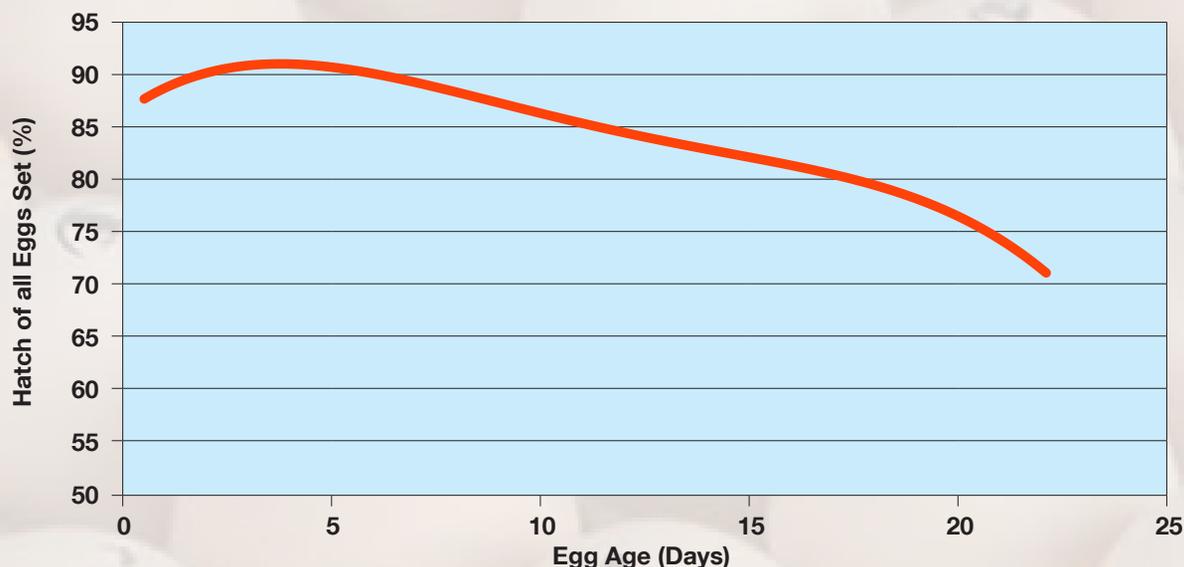


IMPROVE HATCHABILITY BY USING SHORT PERIODS OF INCUBATION DURING EGG STORAGE (SPIDES)

- Eggs stored for more than a few days will not hatch as well as eggs set when they are 3-4 days old (Figure 1).
- Stored eggs have more early embryo mortality, and the embryos that survive tend to be slower to develop and slower to hatch.
- When hatches are delayed, some chicks may not emerge in time to be counted, and chick quality may suffer because the chicks are too immature when they are placed.

FIGURE 1 – HATCHABILITY FALLS AS EGG AGE INCREASES



NATURAL INCUBATION AND SPIDES

- A farmyard hen will lay one egg in her nest every day until her clutch is complete. Each time she returns to the nest to lay an egg, the older eggs already in the nest will be warmed, effectively providing them with a short period of incubation.
- Trials have shown that mimicking the natural process in the nest by introducing **Short Periods of Incubation During Egg Storage (SPIDES)** can help maintain good hatchability in stored eggs.
- Well-implemented SPIDES treatment can restore 60% or more of the hatch decrease that would be observed in untreated stored eggs. If currently 10% hatchability is lost due to storage, implementing SPIDES can improve hatch by 6-7%. The absolute improvement increases as the storage time increases (Figures 2 and 3).
- Because it mimics a natural process, SPIDES has been found to be robust, with considerable flexibility. For example, the heating speed, terminal temperature and target days to implement SPIDES all have a wide range within which the treatment works well.
- Normal storage recommendations (holding eggs below physiological zero 24°C/ 75°F) still apply when the eggs are not being treated.
- Other beneficial effects of SPIDES treatment include:
 - > Reduction in the number of early deaths.
 - > Shortened incubation times. In machines filled with a mixture of egg ages this makes it easier to manage take-off times and to avoid dehydration and overheating of chicks.

- Research continues into how SPIDES works. There is evidence that SPIDES helps rescue cells that would die during egg storage. It is also possible that the heat treatment advances embryo development to a stage that is more resistant to storage.

HOW LONG DOES EGG STORAGE HAVE TO BE FOR SPIDES TO BE EFFECTIVE?

- In trials with broiler and parent hatching eggs, improvements in hatchability have been seen with egg storage periods as short as 7 days (Figures 2 and 3).

FIGURE 2 – THE EFFECT OF SPIDES ON HATCHABILITY OF EGGS STORED FOR 7, 14 OR 21 DAYS

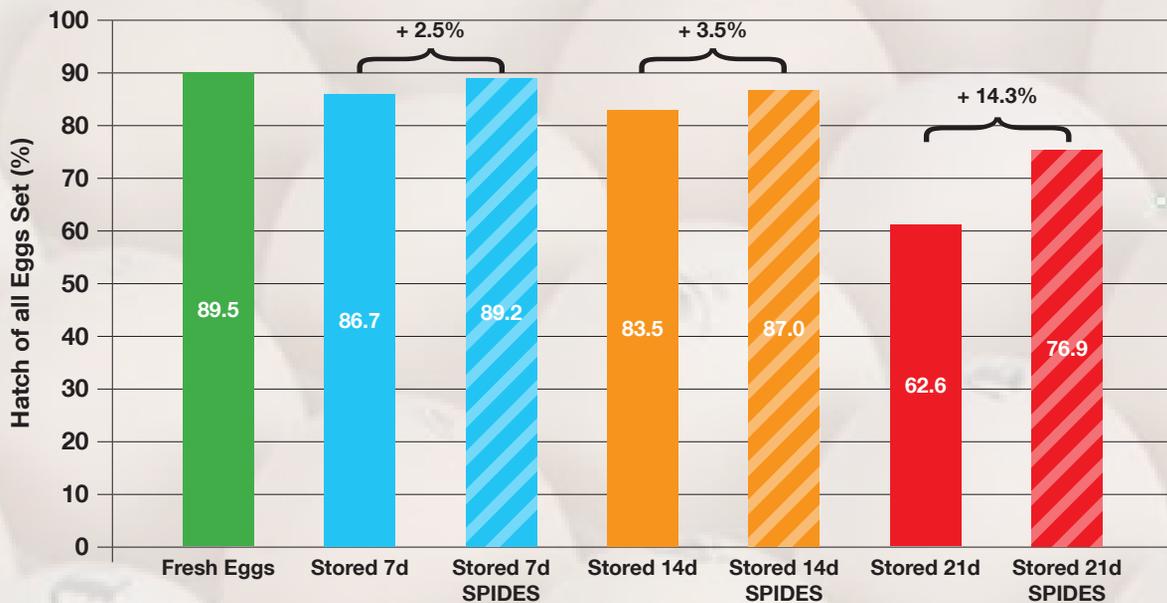


FIGURE 3 - IMPROVEMENT IN HATCH SEEN IN 34 FIELD TRIALS IN 6 HATCHERIES



HOW LONG DOES EGG STORAGE HAVE TO BE FOR SPIDES TO BE EFFECTIVE?

WHAT TEMPERATURE SHOULD THE EGGS REACH FOR SPIDES TO BE SUCCESSFUL?

- Eggshell temperatures need to reach a temperature of between 32°C (90°F) and 38.3°C (101°F) for SPIDES to be effective.

DOES IT MATTER HOW LONG THE EGGS TAKE TO WARM UP?

- The time taken to reach 32°C (90°F) can range from 2 hours to 8 hours, depending on the type of machine used and how full it is.
- The time taken to warm the eggs above 32°C (90°F) does not have any effect on the outcome of SPIDES – fast or slow heating times can both be effective.

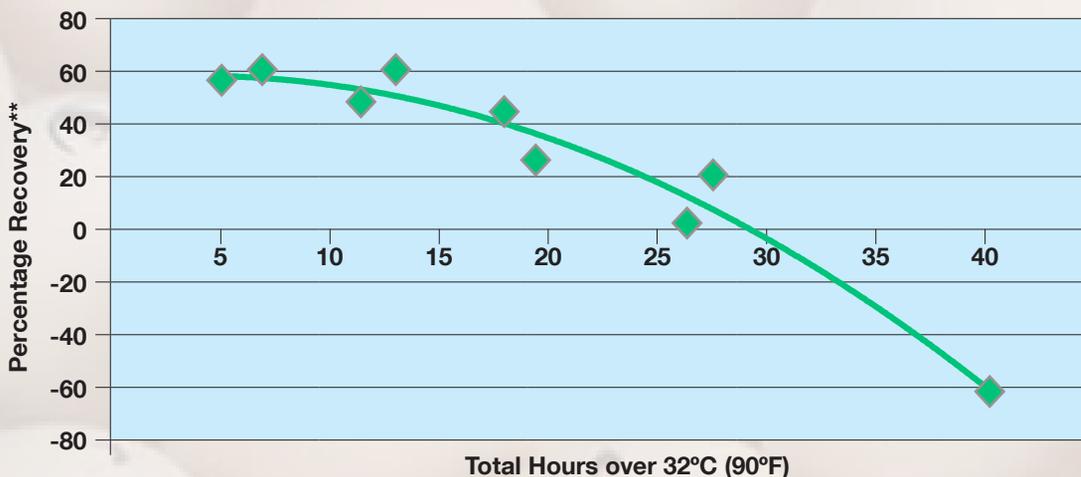
HOW MANY HEAT TREATMENTS WILL BE NEEDED?

- The number of heat treatments needed will depend on how long the eggs are stored.
- The first treatment needs to be given before hatchability begins to decrease – about 5 days into storage.
- The best results will be obtained if the eggs are given repeat treatments at 5 or 6 day intervals.
- Treating eggs when they are fresher than 5-6 days will not harm them.

HOW LONG DO EGGS NEED TO STAY ABOVE 32°C (90°F)?

- Remember that the time the egg is above 32°C (90°F) will include some of the cooling period as well.
- SPIDES seems to work best when the length of time that eggshell temperature is above 32°C (90°F) is short.
- Prolonged time above 32°C (90°F), especially if treatments are repeated several times, will not give as good a result as when the eggs are cooled immediately after the target egg temperature has been reached.
- If giving multiple heat treatments, then the best results will be achieved when cumulative time above 32°C (90°F) (the average time above 32°C (90°F) per treatment multiplied by the number of treatments) is 12 hours or less.
- Once the time above 32°C (90°F) exceeds 28 - 29 hours, there will be no net improvement in hatch due to SPIDES (Figure 4).

FIGURE 4 - HOW MUCH OF THE HATCH LOSS AFTER STORAGE CAN BE RECOVERED BY SPIDES?



**Calculated as (improvement in hatch due to SPIDES)/(loss of hatch due to storage without SPIDES)* 100

PROCEDURE

- Treat the eggs in setter trays held in well-spaced racks on farm trolleys or on setter trolleys.
- Plastic or fiber egg trays which are closely stacked together are not suitable.
- Eggs can be heated using the existing setters in the hatchery. Single or multi-stage machines are suitable although care must be taken with multi-stage machines not to overload their heating capacity with too many cold eggs.
- The eggs must be given enough time in the incubator for the eggshell temperature to reach a minimum of 32°C (90°F), – use Tiny Tag loggers to check locations within the machine to identify hot and cold spots, and make sure that all the eggs reach target temperature.
- Give the first treatment at 4-5 days egg age, and repeat at 5-6 day intervals as necessary.



SUGGESTED TREATMENT FREQUENCY FOR DIFFERENT STORAGE DURATIONS

Egg Age at Set	Number of Treatments	Egg Age (days) at Treatment
7	1	4-5
14	2	5-6 and 10-12
21	3	5-6, 10-12, 15-18

Eggs should be heated until they reach at least 32°C (90°F)

- Once the eggs have reached 32°C (90°F), they should be cooled back to the egg store temperature as quickly and evenly as possible.
- In single stage hatcheries, the setter pre-heat program can be used to cool the eggs down to 24°C (75°F). They can then be moved to the cooled egg store.
- In multi-stage hatcheries, with no opportunity to cool eggs in the incubator, it will be best to move the eggs to the egg store immediately, placing them well away from other eggs in the store. Be aware that if warm eggs are placed back into the egg store immediately they may cause a temporary rise in air temperature in the store.
- Once SPIDES is used on a routine basis, then the existing egg store can be partitioned so that there is a space dedicated to cooling eggs after SPIDES treatment.



TROUBLE SHOOTING

- The table below gives possible causes to consider when SPIDES either doesn't improve hatch at all, or does not restore 60-70% of the loss.

Observation	Possible Causes	Action
Treated eggs hatch no better than untreated eggs.	Eggs did not reach 32°C (90°F) because heating time was too short for the number of eggs loaded in the machine.	Use Tiny Tag loggers to check that heating time is long enough to reach target temperature under prevailing loading conditions.
	Total time above 32°C (90°F) was longer than 28 hours.	Use shorter and fewer heat treatments so that time above 32°C (90°F) totals 12 hours or less. Make sure that the eggs are cooling evenly.
	Eggs packed onto close-stacked trays while still warm on farm.	Allow eggs to cool on separated racks until below 24°C (75°F).
Treated eggs hatch better than untreated, but <60% of the hatch drop has been restored.	Eggs did not reach 32°C (90°F) because heating time was too short for the number of eggs loaded in the machine.	Use Tiny Tag loggers to check that heating time is long enough to reach target temperature under prevailing conditions.
	Eggs packed onto close-stacked trays while still warm on farm.	Allow eggs to cool on separated racks until below 24°C (75°F).
	Total time above 32°C (90°F) was longer than 12 hours (but less than 28 hours).	Use shorter heat treatment time or drop one treatment; make sure that the eggs are cooling evenly.
	Only one SPIDES treatment given to eggs stored for 13 days or longer.	Use additional treatments as shown on page 7.
	No improvement in early embryo mortality, but hatch time is quicker than untreated eggs.	First SPIDES treatment given too late – give the first treatment before 6 days storage.

MORE INFORMATION

- Ross Tech® – Investigating Hatchery Practice
- AVIATECH Hatchery Maintenance
- Others in the Hatchery How To series:

- 01 Measure Egg Water Loss**
- 02 Measure Chick Yield**
- 03 Measure Eggshell Temperature**
- 04 Identify Infertile Eggs & Early Deads**
- 05 Break Out and Analyze Hatch Debris**
- 06 Monitor Setter Temperature Variation**
- 07 Check Your Chicks Are Comfortable**
- 08 Monitor Egg Turning**

