A s storage time of eggs increases, performance losses increase. By using heat treat-
m ent during storage up to 14 days, as part of your standard hatchery
practice, it is possible to gain up to
6-7% in turkey egg performance.
Standard programs have been
developed to advance the develop-
m ent of embryos to a more robust
stage.

More robust developmental
stage

Because turkey production is more
seasonal than chicken and flocks
tend to be smaller, turkey eggs tend
to be stored longer than chicken
eggs and therefore have the poten-
tial to gain more from the use of
Re-Store.

The Re-Store process is used to
advance the morphological devel-
opment of avian embryos from the
embryonic state at point of lay to a
more robust developmental stage.

By doing so, storage of eggs has the
least detrimental effect on incuba-
tion performance.

The morphological development
stages of eggs are often referred to
by a scale known as EGGK or H&H.
This is from a paper written by Eyal-
Giladi & Kochav (EGGK) in 1976,
where they describe the difference
in the embryonic development prior
to point-of-lay, and from a second
paper by Hamburger & Hamilton
(H&H) who describe the stages after
point-of-lay.

Turkey eggs are at stage 7 or 8
(EGGK scale) at point-of-lay. As long
as the collection, storage on farm,
transport to the hatchery and egg
storage room conditions are cor-
rectly managed, they will still be at
stage 7 or 8 EGGK when set in an
incubator.

There is nothing wrong with set-
ting eggs at morphological stage 7
or 8 EGGK. As long as they are fresh
eggs there will be no loss in perfor-
man ce. But the most robust devel-

dopment stage for storage of eggs is
when they are stage 13 EGGK.

This means that if the eggs are
stored at stage 13 EGGK, then they
will lose the least amount of hatch-
ing performance.

Development of standard
automatic programs

To investigate if turkey eggs indeed
benefit more from heat treat-
ment during storage, a cooperation
was agreed with Le Helico in France in
a joint trial that Re-Stored over
three million B.U.T. Premium eggs.
A series of staging investigations
were undertaken to firstly confirm
that the eggs used for testing were
at stage 7/8 and that the historical
Continued on page 15
Continued from page 13

scientific information was still correct. Second, standard automatic heat treatment programs were established to advance the development of embryos to the more robust stage and the results were measured at Le Helloco.

First, eggs were heated above 32°C (89.6°F) the temperature at which development is said to begin) to an egg shell temperature set point of 35°C (95°F) and held at that temperature. Samples were removed hourly.

With the assistance of Dr James Wade, co-author of ‘New observations regarding staging turkey embryos from oviposition through primitive streak formation’, the samples were staged for morphological development stage and the numbers of those stages recorded.

From these trials, the correct temperature and time required at that temperature to take the embryos to the correct development stage (13 EG&K) was discovered and an automatic program to do exactly that was established.

A programme for bringing the embryos to stage 13 EG&K after one heat treatment as well as after multiple heat treatments was established. By using a lower egg shell temperature set point, longer stored eggs can be Re-Store more than once.

### Re-Store eggs outperform untreated eggs by 6-7%  

Once the standard automatic Re-Store programs were established, Le Helloco continued to use Re-Store and record the differences between treated and non-treated eggs over the 2015-16 period.

"When we first decided to start a trial of the Re-Store machine together with Petersime, we wanted to see if we could put the theory of SPIDES into practice in a real hatchery. We were lucky that we could collaborate with a team of experts from Petersime. Our expectations that pre-heating the eggs could help us to improve the quality of our turkey poults was soon confirmed," says Mr Estelle Tanguy-Le Helloco, CEO of Le Helloco.

The results were separated into treated and non-treated, weeks of lay and the usual hatch of set and hatch of fertile.

The conclusion of the analysis of three million eggs was that the Re-Store eggs outperformed the untreated eggs by 6-7% despite the eggs having been stored for an average of 12-14 days.

Yann Denes, Hatchery Manager at Le Helloco, also reported that "the Re-Stored poults were also better quality than the untreated poults." Furthermore, post-hatch mortality for Re-Stored turkeys was lower.

"Now, the Re-Store machine we use daily is both an investment of Le Helloco to improve the quality of the poults we deliver to our customers as well as an investment to make our industry more efficient," added Estelle.

These results were later confirmed by research with turkey breeder eggs from the Hybrid breed realised in a large-scale trial by Hendrix Genetics Turkey France in the heart of its grandparent hatchery in Soucelles.

During more than six months, Cédric Demay, Hatchery Manager, and his team continued with the trials to adapt the Re-Store treatment to the characteristics of the Hybrid eggs and to the time of storage. "As a turkey breeder, the choice to work with Petersime on the BioStreamer Re-Store was relevant to us, because optimising storage of our eggs is a key factor in the quality of our day-old breeders and these trials proved that we were right in our choice," underlines Guillaume Simonneau, responsible for production at Hendrix Genetics Turkey France.

"Indeed, nobody was expecting such exceptional results, since we were testing breeder eggs instead of commercial turkey eggs. Nevertheless, hatchability for fresh eggs (stored for 1-15 days) increased by 2.3% and for older eggs (stored for 16-24 days) by 3.3%. Poults quality from Re-Stored eggs was seen to be better. Re-Stored birds showed a slightly lower mortality. And no negative impact was seen."

### Conclusion

In conclusion, since turkey eggs tend to be stored longer than chicken eggs, they have the potential to gain more from the use of heat treatment during storage. This was confirmed during large scale trials at Le Helloco, where hatch of set of Re-Stored commercial turkey eggs outperformed the untreated eggs by 6-7%. Another large scale trial with turkey breeder eggs at Hybrid Genetics Turkey France also found an increase in hatch of set by 2.3-3.3% when eggs were Re-Store.

In both trials poults that had received a heat treatment were of better quality and had lower post-hatch mortality rates. Overall, hatchability rates and chick quality improved by using the Re-Store machine.

### Rules to follow

During the trials it was discovered that to achieve consistent results a number of rules have to be followed:

- The total time for Re-Store treatment for turkeys is around 20 hours. It will depend on egg size, cold store temperature and egg temperature at removal.
- To ensure a uniform treatment, the eggs are heated to a specific shell temperature and held at that point.
- Too much time above 32°C will take development beyond ‘the point of no return’. Then the eggs will need to be incubated to the point of hatching, not returned to the cold store.
- Eggs must be returned to the cold store to ‘rest’ for a minimum of 24 hours after treatment before setting.
- Always try to fully load the machine to ensure an even airflow and homogenous environment. The idea is to give all eggs exactly the same treatment.
- The software and hardware have been modified for Re-Store and OvoScan, so they do not work in the same way as a standard setter.
- To achieve optimum consistent results, you have to optimise farm conditions, transport and hatchery procedures. Re-Store can only take development further, not backwards.

### References

References are available from the author on request.

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Fig. 3. Increase in hatch of set for commercial turkey eggs with Re-Store treatment.

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Fig. 4. Increase in hatch of set for breeder turkey eggs with Re-Store treatment.

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