

Short periods of incubation during egg storage (SPIDES)

by Dr James Wade and Andrew Cleare, Aviagen Turkeys Ltd.

If hatching eggs are stored for more than a week before being set in an incubator their hatchability begins to drop. When they are stored for longer than 14 days, the hatch loss can be substantial, and is often hard to predict. Due to variable order patterns and sizes as well as seasonal fluctuations in demand it is not always possible to set all eggs within seven days of lay.

Where this problem is foreseen adjustments in storage practices can be made:

- Slightly reduced temperature and increased humidity.
- Storage in boxes or plastic bags to reduce moisture loss.
- Flushing with carbon dioxide.
- Storing the eggs pointed end up.
- Turning eggs during storage.

However these precautions will not prevent a reduction in hatchability but will only help to slow down the deterioration.

Increased storage

Prolonged egg storage affects both the dormant embryo and the incubation chamber (egg) that contains it. With increased storage the internal quality of the egg deteriorates, this affects both the albumen quality and vitelline membrane integrity.

Embryo metabolism is also depressed, and there will be increased embryonic cell death. This deterioration in quality within stored eggs results in a higher proportion of candled clears due to increased early embryo mortality.

Eggs will also take longer to hatch and there are typically an increased proportion of culled first day old chicks. There is evidence that strategically applied heat treatments during the storage period can advance the developmental stage of the embryo, taking it to a state better able to survive storage.

It is thought that these brief periods of incubation induce the repair/regeneration of embryonic cells, and thus minimise the

	Brown N BA21	Grey BA 21	Benefits
Treatment	Control	1x 6 hour treatment	
Egg age (days)	11-12	11-12	
Eggs set	462	465	
Live poults	380	391	
Hatch of set (%)	82.30	84.10	+1.80
Hatch of fertiles (%)	84.40	86.50	+2.10
Cull	0	0	0
Live pipped	13	8	-5
Dead pipped	3	3	0
Clear	12	13	1
23-28 days	9	7	-2
16-22 days	7	11	4
10-15 days	6	2	-4
3-9 days	19	20	1
0-2 days	13	10	-3
Unhatched/cull	82	74	-8

Table 1. Results for eggs stored for 11 and 12 days under normal storage conditions.

damage induced by long term storage. Research on this topic initially looked at treatments given on-farm (pre-storage incubation) aiming to advance embryonic developments before the eggs were cooled. This showed some benefits, but proved difficult to manage on a large scale practical basis.

Ar and Meir (2002) noted that application of heat treatments during egg storage raised the possibility of applying this technique on a larger scale in the holding area of a hatchery or in a storage depot. This technique of short periods of incubation during egg storage became known as SPIDES.

Implementation of SPIDES

Aviagen have been looking at the implementation of SPIDES within their chicken hatching operation as a way of improving results within hatcheries where egg age is often over seven days due to natural rhythms in egg production and chick order patterns. To date, the SPIDES

technique has been found to give 2-3% better hatch in eggs stored for 7-14 days and higher benefits when eggs are stored for over two weeks.

Following these successful trials with chicken hatching eggs Aviagen Turkeys have been looking at the application of the technique to turkey eggs. Several trials have been completed at the Grantham, UK, hatchery.

In one trial eggs were stored for 11 and 12 days under normal storage conditions (Table 1). Half of these eggs were raised to 38°C for six hours on day eight and then returned to normal storage until setting. Benefits were seen in hatchability in the group having the heat treatment over the control group.

A second trial looked at the effect of turning in combination with a heat treatment. The results from this work are shown in Table 2 and demonstrate a benefit from the treatment including turning.

There has been much less research performed on SPIDES in turkey eggs that

Continued on page 28

Continued from page 27

have been stored long term. However it appears that the basic principles applied to SPIDES treatment of chicken eggs are applicable to the turkey. More work will continue on this topic

At this early stage of the work the following guidelines are believed to apply:

- A single SPIDES treatment is sufficient to improve hatch in eggs stored from 15-17 days, but needs to be given on or around 8-10 days.

- Hatch improvements can be greater if two or three treatments are given depending upon how long the eggs are stored.

- Typically no more than seven days should be left between treatments.

- Where multiple treatments are applied there should be an equal amount of time left between treatments.

- SPIDES works in all incubator makes and types tested so far, so long as the heating times are adjusted as necessary.

- It is not helpful to pre-define a heat treatment in terms of time – as this will vary with egg numbers and incubator type.

What is important is that the eggs are warmed to just below incubation temperature and then cooled.

- Infertile eggs will not be affected.

- Greater hatch improvements are likely to be seen with eggs that have been stored for more prolonged periods and have lost a lot

Treatment	Control	1x12 hrs turned	Benefits	1x12 hrs not turned	Benefits
Egg age (days)	15-17	15-17		15-17	
Eggs set	1116	1116		1116	
Live poults	769	879		910	
Hatch of set (%)	68.91	78.76	9.85	81.54	12.63
Hatch of fertiles (%)	72.89	83.32	10.43	85.45	12.56
Cull	1	3	2	3	2
Live pipped	45	35	-10	21	-24
Dead pipped	28	16	-12	20	-8
Clear	61	61	0	51	-10
23-28 days	20	16	-4	13	-7
16-22 days	31	24	-7	22	-9
10-15 days	24	21	-3	19	-5
3-9 days	63	27	-36	39	-24
0-2 days	68	30	-38	21	-44
Unhatched/cull	3	0	-3	1	-2

Table 2. The effect of turning in combination with a heat treatment.

of hatchability – the higher the hatch loss, the greater the improvement.

- SPIDES treatments give a tighter hatch window – less hatch delay from SPIDES treated stored eggs.

- Poult quality will generally be better after

SPIDES treatment compared to untreated eggs.

- It is possible to overdo the heat treatments and kill the embryos.

- Setting too soon after heat treatment can have negative effects. ■