

Increased Egg Age and the Impact on Hatchability

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In the turkey industry, it is not uncommon to see increased egg age at times due to the unpredictability of the market and the nature of turkey breeder production. Therefore, it is very important to understand the impact of increased egg age on hatchability and poults quality, as well as steps that can be taken to minimize that impact.

Increased Incubation Time

When an egg is laid, the embryo consists of roughly 40,000 cells. It immediately starts to cool, lose CO₂ and water, and begin to undergo rapid chemical changes. The egg reaches equilibrium between 4-5 days. At this point, gas exchange slows and albumen pH stabilizes. Unfortunately, protein and cell degradation begins to occur as does subsequent embryo/egg quality. The albumen begins to thin and embryonic cells begin to atrophy.

Since the embryo will now have fewer cells once incubation begins, it will need more time to regrow the cells it lost during storage. Therefore, it will require a longer incubation time. If adequate time is not given, the hatch is delayed and some poults may not emerge in time to be counted and poults quality may suffer because the poults were too immature when pulled. The amount of incubation time added should increase the longer the eggs are stored, see **Table 1** for the Additional Incubation Time Recommended for Older Eggs. Please note that the actual incubation times may vary depending on the particular operation.

Table 1 Additional Incubation Time Recommended for Older Eggs

Days From Lay	Hours	Days From Lay	Hours
0-6	0.00	14	2.50
7	0.50	15	3.00
8	0.50	16	3.00
9	1.00	17	3.50
10	1.00	18	4.00
11	1.50	19	4.50
12	2.00	20	4.50
13	2.00	21	5.00

Impact on Hatchability

Even with incubation time adjustments, increased egg age will still impact hatchability. Eggs can be stored between 2 to 7 days with minimal effects on hatchability. Extending egg storage beyond 7 days will begin to result in decreased hatchability, the longer the storage the greater the decline. Eggs that have been stored for extended periods of time, 14

days or more, tend to have higher embryonic mortality. The embryos that survive tend to be slower to develop and slower to hatch, thus increasing the hatch window. **Figure 1** demonstrates the anticipated decrease that longer storage time has on hatchability for heavy strains. The figure includes breeder flocks with weeks of lay from 1 to 30. The hatchability trend on medium strains follows a very similar trend except it is slightly delayed and diminished comparatively.

In addition to a reduction in hatchability, longer storage time can also influence poult quality by increasing the number of cull poult, see **Figures 2 and 3**. In summary the detrimental effect of extended egg storage is two pronged: a higher percent of embryonic mortality resulting in reduced hatchability and an increased number of cull birds at hatch.

Figure 1 Impact of Egg Age on Hatchability

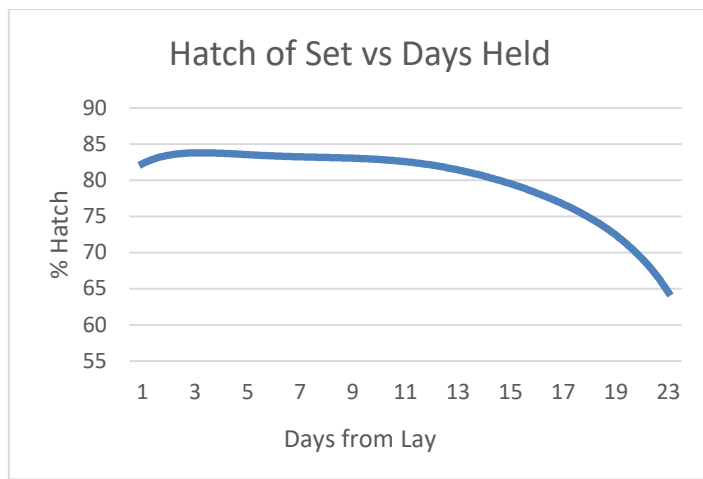


Figure 2 Impact of Egg Age on Cull Poult

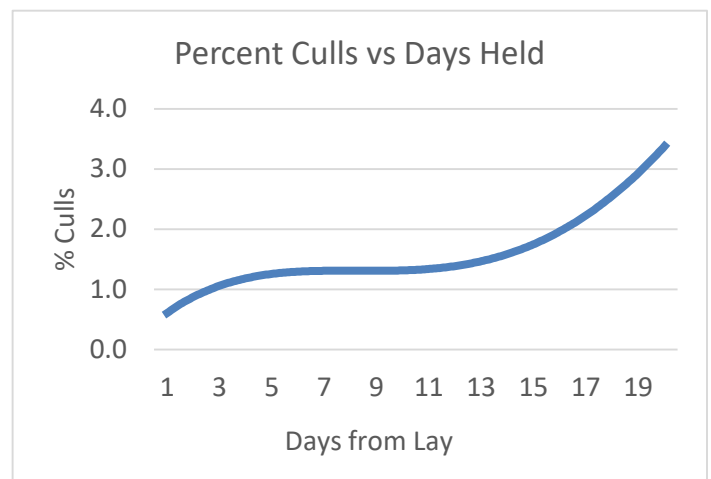
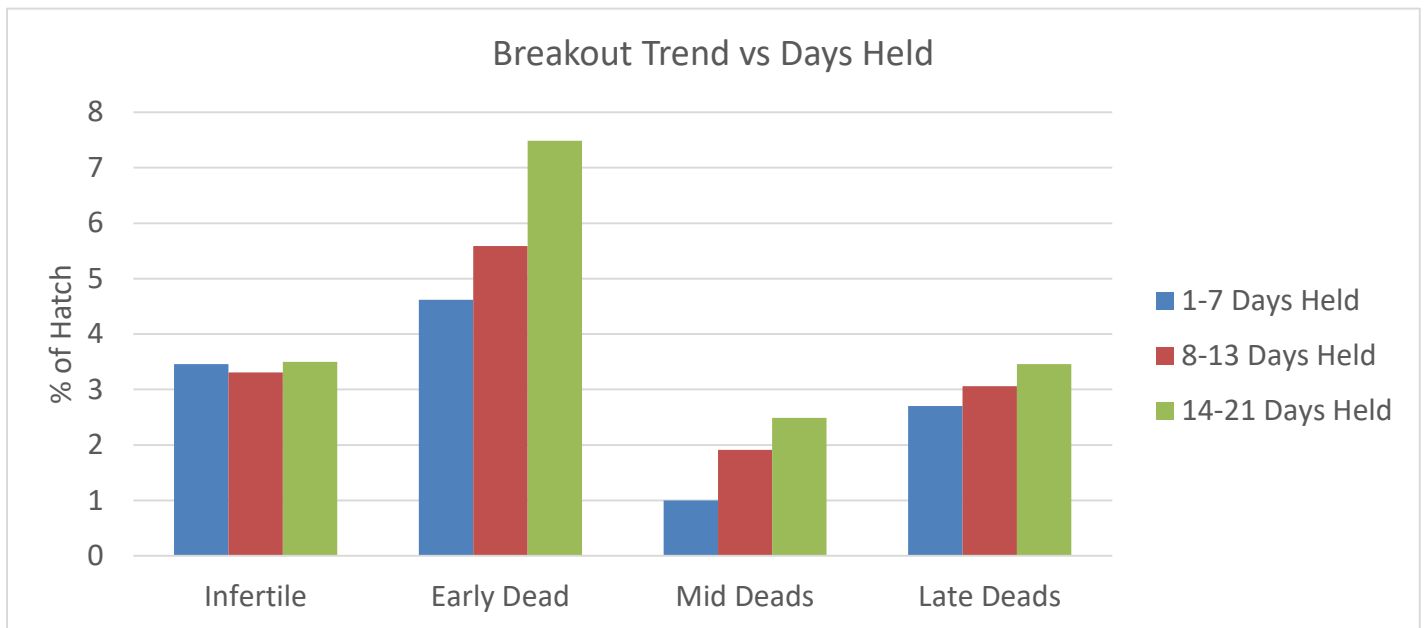


Figure 3 Impact of Egg Age on Egg Breakout



Breeder Flock Age

The age of the breeder flock is another factor to consider as it affects the ability of eggs to withstand long egg storage. Eggs from younger or older breeder flocks (less than 5 or greater than 19 weeks of lay) are less able to tolerate long egg storage and therefore the impact on hatch is greater. There will be significantly more early embryonic mortality when holding eggs from very young or old breeder flocks compared to prime aged flocks.

Improving Hatchability from Older Eggs

Several techniques have been shown to improve the hatchability of eggs stored more than 10 days. These interventions will not prevent a reduction in hatchability, but will simply slow down egg deterioration thus lessening the impact on hatchability and poult quality.

Storage Interventions include:

- Ensure all eggs are correctly identified with the day of production so that the oldest eggs can be set before the freshest eggs.
- Adjust set times to allow sufficient incubation time for the embryo to fully develop. (See Table 1)
- Reduce egg storage temperature to 58°F (14°C).
- Store the eggs under plastic covers after they are cooled. This traps the carbon dioxide the eggs are giving off and slows down the breakdown process.
- Artificially add and/or flush the eggs with carbon dioxide to slow the degradation process.
- Turn the eggs during storage.
- Store eggs upside down – Care needs to be taken to prevent cracking
- Heating the eggs to 99.5°F (37.5°C) for 12 hours prior to storage
- S.P.I.D.E.S- Short Period of Incubation During Egg Storage - *This has been found to be successful in chicken hatcheries and a few turkey hatcheries, but this is still a somewhat novel approach for hatching turkey eggs.*
- Use a slow and steady pre-warm process when bringing eggs up to incubation temperature to help alleviate the shock to the fragile embryo and reduce some of the early deads.

The ebbs and flows of egg storage are inevitable; the key is learning how to navigate through them. Egg age will continue to be a part of the turkey industry, and while there are certain things we cannot change, there are definitely interventions that we can use to minimize the impact.