HatchTech
INCUBATION TECHNOLOGY

Technical Information

Alternative egg storage methods: small end up or turning

Dr. Inge van Roovert-Reijrink M.Sc.

After oviposition, hatching eggs are first stored at the breeder farm and then transported to the hatchery and stored again before they are finally placed in an incubator. The storage duration depends on the supply of hatching eggs, the hatchery capacity, and the market demand for dayold chicks. Normally, commercial hatcheries try to set their eggs after 3 to 5 days of storage to minimize the negative effects of egg storage on hatchability and chick quality.

However, in some situations a hatchery manager has to deal with storage durations beyond 7 days. It is well known that a storage duration beyond 7 days increases incubation duration, decreases hatchability, decreases chick quality, decreases subsequent growth performance, and increases post-hatch mortality.

Changes in the storage temperature, relative humidity, and gaseous environment can decrease the negative effects on hatchability and chick quality caused by prolonged egg storage. However, there are also some additional methods to minimize the decline in hatchability: storage in the small end up position and turning during storage.

Small End Up Storage

Eggs are normally stored in the large end up position. In this position, the embryo is located beneath the air cell. After oviposition, the egg loses water and the air cell increases. It is hypothesized that the embryo has a higher chance to dehydrate or to stick to the internal eggshell membrane when the egg is stored in the large end up position rather than in the small end up position.

Research has shown that when eggs are stored longer than 7 days, the decline in hatchability can be reduced by 15% when eggs are stored in the small end up position instead of the large end up position. This is due to a reduction in early and late embryonic mortality. The positive effect on hatchability depends on several factors such as breeder flock age, storage conditions, quality of the egg components, and embryo viability. However, also smaller improvements than 15% will still result in greater profit.

Turning During Storage

When egg storage is longer than 7 days, research has shown a positive effect of turning during storage on hatchability. The positive effect of turning during storage on hatchability varied between 2 and 8%. As in the small end up position, the actual improvement in hatchability depends on the age of the breeder flock, storage conditions, quality of the egg components, and embryo viability. In addition, the improvement in hatchability also depends on how often eggs are turned and the turning angle.

The positive effect of turning during storage is higher in old breeders (> 50 weeks) than in young breeders (< 35 weeks). This might be due to the reduced shell and albumen quality in eggs from old breeders. The improvement in hatchability is also greater when the early and late embryonic mortality of a flock is already high instead of low. The impact of turning during storage has not been investigated extensively, but turning eggs 4 times daily over 90° has been shown to have a positive effect on hatchability.

In conclusion, storage in the small end up position or turning during storage can significantly reduce early and late embryonic mortality. It will increase your profits, especially in eggs that are highly sensitive to prolonged egg storage.

Additional information

Possible explanations for the fact that storage of eggs in the small end up position and turning during prolonged egg storage has a positive effect on hatchability:

1. Storage in the small end up position and turning during storage prevents dehydration of the embryo.
2. Storage in the small end up position and turning during storage prevents the embryo from sticking to the internal eggshell membrane.
3. Storage in the small end up position and turning during storage may increase the contact of the embryo with important nutrients that are required to survive prolonged egg storage.
4. Storage in the small end up position and turning during storage may prevent changes in the albumen or membranes that negatively affect the development of the chorioallantois membrane. The chorioallantois membrane performs multiple functions during embryonic development, such as exchange of respiratory gases, calcium transport from the eggshell to the embryo, acid-base homeostasis in the embryo, and ion and H_2O reabsorption from the allantoic fluid. Proper functioning of the chorioallantois membrane is crucial during embryonic development. When this membrane is not able to function properly, hatchability and chick quality are negatively affected.

References

Becker, W.A., Spencer, J.V., Hawkes, B.W. 1969. *Angle of turning chicken eggs during storage.* Poultry Science, 48: 1784.

Elibol, O., Brake, J. 2008. *Effect of egg position during three and fourteen days of storage and turning frequency during subsequent incubation on hatchability of broiler hatching eggs.* Poultry Science, 87:1237-1241.

Elibol, O., Peak, S.D., Brake, J. 2002. *Effect of flock age, length of egg storage, and frequency of turning during storage on hatchability of broiler hatching eggs.* Poultry Science, 81:945-950.

19_314_HAT.110