Moisture loss: is it a thing of the past, or is it still of value?

Moisture loss appears to have lost its significance for many hatchery managers. Is this true for your hatchery? Why do many hatcheries no longer find value in moisture loss data? Is it because they no longer see the need with modern incubation equipment? Is it because they are too busy collecting mountains of data for other reasons leaving no time to collect this data? Or is it because we just do not know or recognise the value of this information?

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Knowing your moisture loss is essential for hatchability trouble-shooting reasons. When chicks are hatching but have inadequate moisture loss, they can look the same as when an incubator temperature is incorrect, ventilation issues, etc. This could have you chase an issue that does not exist, therefore understanding what is causing your hatchability issue is critical to understanding the root cause of the problem. Typically, when the eggs achieve the proper water loss, the air cell should occupy about one third of the egg at transfer.

The location on the egg where the embryo pips through the eggshell is also another good indicator of proper moisture loss but can be subjective. Proper air cell size is important for the day-old to be orientated in the correct position for pipping out of the shell.

If the air cell is too small, the day-old will have to twist its head up which will then impede the pipping process by altering the day-old from the proper pipping position. If the embryo is not able to internally pip the air cell the embryo will not be able to complete the external pipping process and will most likely die.

Calculating moisture loss on eggs during the incubation process is very easy and provides an important metric in achieving good hatchability and day-old quality. It provides the information needed to know how much moisture is being removed from the eggs during the incubation process.

All avian species require a certain amount of moisture to be lost for proper air cell development. When the moisture loss is too high or not high enough, issues with hatchability and day-old quality will occur.

The ideal moisture loss will vary depending on the species being incubated and the type of incubator equipment.

For Jamesway multi-stage incubators we are looking to attain 11-13% moisture loss, and with the Jamesway single-stage machines we are looking to achieve 9-11% moisture loss. If you are using another brand of incubation equipment, you would need to consult with your incubator manufacturer to determine the proper moisture loss for your hatchery.

Factors affecting moisture loss

Many factors will influence the amount of moisture loss from the eggs, such as incubator humidity settings, single-stage incubation, multi-stage incubation, damper opening, incubator room conditions, plenum pressures, seasonal effects, breeder flock age, egg size, specific gravity, strain, species, etc.

This calculation is expressed as a percentage of the average weight loss of the eggs from day of set to transfer. The formula for moisture loss is shown in Table 1, along with an example calculation.

The typical procedure for moisture loss calculations is:

- Identify specific hatching trays for the moisture loss testing.
- Perform moisture loss testing for each hatch day, on young, prime, and old flocks to obtain trend data on your incubators, and breeder flocks.
- As a minimum, test each flock on a weekly basis, to obtain moisture loss trend information on that flock.
- Weigh a minimum of three trays per flock; one each from the top, middle, and bottom positions in the incubator rack. To improve the quality of the data, use the same top, middle, and bottom tray positions for all incubators.
- Ensure these trays are properly identified during the process to ensure data continuity.
- Weigh the marked trays prior to setting the eggs and record the information.
- At transfer weigh the same trays of eggs and record the information.
- Weigh the same marked empty trays after transfer.
- Calculate the moisture loss from the top, middle and bottom trays on the flocks designated.
- Record the data by flock, by incubator, by incubator hall, breed, season, etc.
- Analyse the data and respond accordingly.

	Set weight	Transfer weight	Moisture loss %
Top*	12.15	11.05	9.82
Middle	12.25	11.15	9.73
Bottom	12.40	11.20	10.48
Top	13.30	12.15	9.31
Middle	13.35	12.20	9.27
Bottom	13.25	12.05	9.76

*Data for sample calculation

$$\%\ ML = \frac{\text{egg tray wt. at set} - \text{egg tray wt. at transfer X 100}}{\text{egg tray wt. at set} - \text{empty tray weight}}$$

$$\bullet\ ML\% = \frac{12.15\text{-}11.05 \text{ X } 100}{12.15\text{-}0.95} = 9.82$$

Table 1. The formula for moisture loss and an example of data calculation.

Practical advice

- Collect moisture loss data daily.
- Collect moisture loss data on each flock weekly.
- Collect the data and store electronically.
- Analyse the data, graph trends by flock, incubator, season, incubator hall, etc.
- Does the data make sense? Validate the data. Does the moisture loss data confirm or deny the observed pipping signs from the hatch residue? When graphed does it stand out as way off from previous collections?
- Finally, respond to the data accordingly.

It is important to recognise your moisture loss in relation to the egg pack. Eggs from older breeders tend to have a higher moisture loss and, conversely, eggs from younger breeders tend to have a lower moisture loss. The reason this is so important to know is when evaluating the data, the data is not misinterpreted based on a single data point.

Multiple data points are needed, and trends evaluated to make good, informed management decisions. That is why continual moisture loss data collection is of great value.

Moisture loss is a vital basic tool that every hatchery manager should know and have to properly manage the incubation process year-round.

Optimal hatchability and day-old quality are all dependent on proper moisture loss among other metrics, so why are so many hatcheries not collecting this data?

Is moisture loss data a thing of the past or does this information still have value? I believe that good moisture loss data is still a vital metric and just as important today as it ever was. ■