

Humidity Guidelines for Incubation

Many people find humidity settings in the incubator difficult to understand and changing atmospheric conditions, coupled with modern incubation materials, heaters and temperature controls, mean that protocols which worked in an older incubator 50 or more years ago, are no longer valid.

We have produced these guidelines to try and help you understand humidity and hopefully produce a better result from your incubator.

Humidity in the incubator is one of the factors which determine the weight loss of the chick over its incubation period. (Ambient humidity, shell thickness and porosity are other factors). The average weight loss of an egg between setting and internal pipping should be between 11- 13% (13-15% for ratities). The higher the humidity in the incubator the slower the weight loss is achieved, and vice versa.

More chicks are lost through humidity which is TOO HIGH than humidity which is TOO LOW!

Humidity which is too high in the incubator has three main effects:

Firstly, the membrane separating the chick from the air space will be thick and rubbery, which makes it difficult for the chick to break its way through into the airspace immediately prior to hatching. It may spend a long time attempting to break the membrane and then when it finally does so, (if it does so), it is so exhausted it does not have the energy left to make much more progress. For this reason, there should be a 'dry-down period' from the 15th to the 20th day (for chicken), when the embryo is about to peck through the membrane into the airspace. Once in the airspace, the humidity can be increased for hatching.

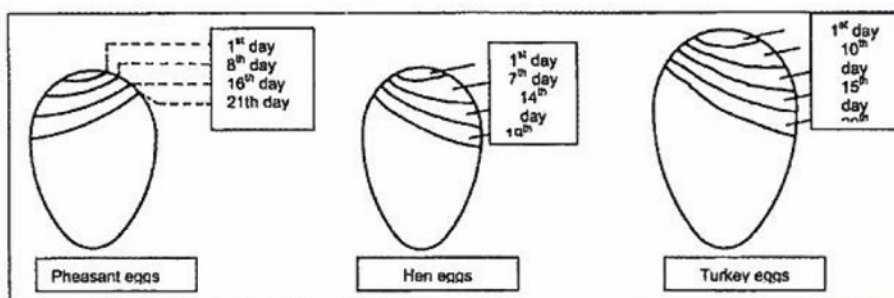
Secondly, with too much fluid around, the chick will tend to be large and lethargic, it will be a tight fit in the shell and does not have the space to rotate as it pecks through the shell - hence the common scenario of eggs with a single pipping hole and no more.

Thirdly, with too much fluid around, the surplus mucus tends to dry hard like glue once the egg is pipped and it is exposed to the atmosphere, further trapping the chick inside the shell.

The best way of determining an accurate required humidity level is by weighing the eggs (or the tray of eggs) from start to finish every few days. These results can then be plotted on a graph and humidity can be adjusted either up or down, depending on the performance of the eggs against the graph. A set of accurate digital balances is required for this procedure, with a resolution of 0.01g.

ESTIMATING REQUIRED HUMIDITY USING A CANDLING LAMP AND AIRSPACE SIZE

For those who do not wish to weigh their eggs, a candling lamp should be used to monitor the growth of the airspace. The airspace needs to increase in size to take up approximately one third of the egg, by the time it is due to hatch. When candling in the early stages of incubation, the operator needs to estimate whether the airspace appears to be on course to achieve this size, or whether it is growing too fast or too slowly. Humidity levels in the incubator should then be adjusted in the light of the evidence. Experience in candling will come only with practice!



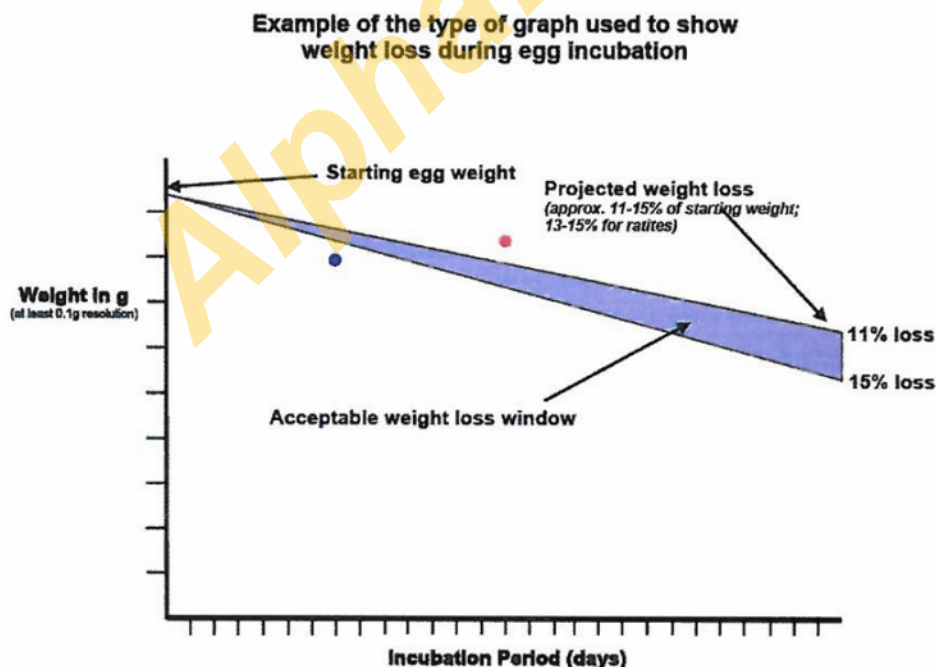
Approximate size of air space during incubation

Humidity Guidelines for Incubation... cont.

It should be remembered that, if humidity levels have been correct during the setting period, the chick will penetrate the membrane with the first peck, there will be little surplus mucus, it will be lively, energetic and not over-large and therefore be able to complete the process within a short space of time; whether or not the humidity levels are raised for hatching will be of little consequence. However, if the humidity levels have not been correct, all the problems listed above mean that it is important to ensure that humidity in the incubator for the last day of incubation is as high as possible.

The other factors affecting weight loss, such as shell thickness and porosity vary both according to breed and over the length of a season, with end-of-season eggs being more porous and with thinner shells. Ambient humidity will also tend to increase over a season (warm air holds more moisture than colder air), so settings which are successful at the beginning of a season may have to be adjusted to compensate for other factors a few months later.

On the next sheet is a suggested protocol for weighing eggs during incubation for the purpose of determining the required humidity levels.



- If actual egg weight on any particular day of incubation is below the "Acceptable window" then humidity should be increased to compensate
- If actual egg weight on any particular day of incubation is above the "Acceptable window" then humidity should be decreased to compensate

SUGGESTED BASIC HUMIDITY PROTOCOL USING WEIGHT LOSS

Set the incubator up 24hrs before you need to set your eggs using the following settings as a guide for chicken eggs.

Temp - 37.5° C

Humidity - 30% RH

1. Before setting, clean your eggs in a solution of water mixed with a proprietary egg sanitizer (such as Chicktec Hatchery Sanitiser) at a temperature which is warmer than the egg, but no higher than 34° C.
2. When setting your eggs mark them on each side, this will demonstrate that the eggs are turning inside the incubator as the markings will move position.
3. Check the weights of either individual eggs or the whole tray (remembering to subtract the weight of the tray from your calculations) before setting and take a note of these.
4. Now your eggs are set, add your weights to a graph with the days marked across the bottom and the weights up the side.
5. Work out 11 % weight loss from your initial reading and plot this on day 21
6. Work out 13% weight loss and again plot this on day 21
7. Draw a line from your starting egg weight to the 11% loss plot.
8. Draw another line from your start weight to 13% loss plot
9. You should now have a triangular shape on your graph, this is the acceptable weight loss for your egg, any further weight readings should fall between (or very close to) the two lines. (See diagram on page 2)
10. Weigh your eggs every few days and plot this on the chart, if your reading is above the triangle you should decrease the humidity setting on the incubator, and vice versa.
11. On the very last day of incubation when candling shows that most of the chicks are through into the airspace or when a third of your viable eggs are externally pipped, (and not before!) turn your incubator's humidity up to approx 60%. This will help to prevent any mucus (though there shouldn't be any!) sticking to the shell.

These guidelines should steer you in the right direction but remember they are only guidelines and adjustments must be made bearing in mind your situation (high humidity/on the shore of a lake etc.) the season and the species you are breeding.

Once these rules have been followed and a successful hatch has been produced you may not need to go through the rigmarole of weight loss graphs and so on, but it is the best starting point and, with humidity, anything is liable to change over a season!