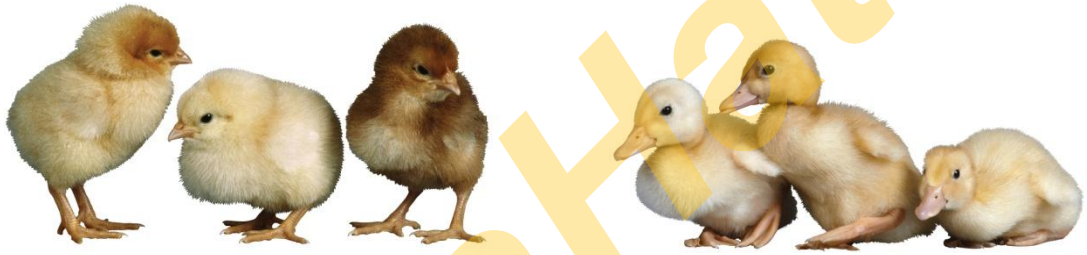
SO YOU WANT TO INCUBATE..?!

Without a doubt, the best incubator of eggs is a broody hen. She knows her job - by instinct, knows how to turn the eggs, move their position in the nest for even incubation, knows when an egg is too hot or too cold, when it is infertile or dead in shell, and when the eggs have hatched, she is the best manager of chicks you can find.

However, the good old broody has her disadvantages too:
Firstly, she's rather limited in the number of eggs she can hatch and the size of eggs she can hatch - ever seen a bantam hatch an ostrich, an alligator or a queen bee?
Secondly, she hardly ever goes broody when you need her, and quite often when you don't!
Thirdly, some avian species don't make good parents and the risk is too great if the eggs are valuable.

To be able to hatch in quantity and when you want to, you have to turn to incubation in an independent incubator *(unless you feel like carrying eggs around under your armpits for 3 weeks like they did in Egypt!)*



These notes are intended to help you choose which incubator suits your needs and your pocket best.

Before starting to select your incubator, consider the following questions:

1. How dedicated are you to incubation? Is it a first time curiosity or have you got some specific interest? The inexpensive Hovabator, Covatutto, Ecostat and Chicktec models are ideal for 'first timers' but we have many seasoned breeders using them as well. If you move on to more expensive incubators later, your first purchase may still make a very good hatcher.

2. Are you able to use 220/240v (mains) electricity or do you need to look at 12v incubators? The Ecostat, Hatchmaker and Polyhatch incubators are available in 12v versions to run off a car battery. (The low voltage Hovabator models are supplied with a transformer and designed to run from mains voltage.) Our Power Inverters enable many smaller mains voltage machines to be operated from a battery source.

3. Are you limited in the physical space your incubator can take up? Cabinet incubators give greater egg capacity without increasing floor space.

4. Are you thinking realistically about the size of incubator you will need? If you think that your requirement is for a large capacity incubator, will you have enough eggs to set all at once? Batch hatching isn't always easy without experience, particularly with waterfowl eggs. It is often more worthwhile (and usually cheaper!) to consider buying two or more small incubators and setting one per week. If you do want to batch hatch, consider a cabinet incubator as these can usually be managed more easily to cope with a differing humidity requirements of the batches.

5. Eggs need turning at least three times a day (ideally 5 or more times for some species), every day for three or four weeks. If you are thinking of a manual turning incubator, can you be sure that someone will be there to turn them? Irregular turning, especially during the first week, means that eggs are unlikely to hatch. If you can't be sure of regular turning, you should think of an automatic turning incubator. If somebody can turn the eggs every day but doesn't have the time (or expertise) to turn every egg individually, look at the semi-automatic models.

6. Are you thinking of hatching different species together? For instance, goose with hen, bantams with duck? Don't, unless you are very experienced! Different species take different times to hatch, but, more importantly, require different temperatures and humidity, especially in a still air, table top machine. This is another case for using several smaller incubators. If you must mix types of egg, consider a circulated air, cabinet incubator.

7. How often are you going to hatch each year? If only once or twice a year to provide your own replacement stock, then you don't need to buy the most robust model. If you're going to hatch continuously throughout the season, consider using a small incubator or separate hatcher for hatching only. This means that most of the incubation can be done in one (automatic?) incubator and the eggs transferred to the hatcher for the last 48 hours, when they don't need turning. This way, you only have to clean the hatcher out and your main incubator can be left running without interruption.

8. Are you buying on price or size only? Price is not necessarily related to egg capacity. Remember that, in our range of incubators, most have electronic thermostats, and, whatever the capacity given, they are just as happy hatching only a few eggs.

INCUBATOR TERMINOLOGY - TECHNICAL

TURNING

Incubators are described as **manual turning**, which means that each egg has to be turned through either 180° horizontally or 90° vertically, at least three times a day, by hand or **semi-automatic** which means that, although the turning must be done by hand, all the eggs can be turned together by use of some mechanism e.g. a rod, cord etc. **Fully automatic turning** is where the eggs are turned automatically by means of an electric motor. The automatic turning can, of course, be switched off when required. For some specialist purposes we supply machines to incubate eggs that do not need turning.

Vertical of horizontal turning? It is obvious that a broody hen turns eggs horizontally and research into various avian species has shown that, for at least some species, membrane and embryo development benefit from the eggs being turned horizontally through 180°for at least the first 10-15 days of their incubation period. This requires an incubator which has either rollers or moving floor, rather than trays with inserts which tip the eggs vertically through 90°for the whole incubation period.

Most domestic species will hatch equally well whether eggs are tipped or rolled and 95% of all commercially incubated eggs are set vertically and tipped through 90°. However, if you wish to hatch parrot-type eggs, especially macaws, or exotics, such as night herons or spoonbills, or any egg in which the yolk is very small in proportion to the albumen, optimum vein growth will only be achieved if eggs are placed on their sides and turned through 180° at least for the first 60% of the incubation period. (after this, it is immaterial whether the eggs are horizontal or vertical.) If the only incubator you have available is a tipping variety such as an Octagon 20, you can compromise by setting the eggs on their sides and turning them by hand up to 7 times a day, in addition to the automatic turning, for the first 60% of the incubation period.

If your budget will stretch to it, you could consider programmable turning for this type of egg. Conversely, if you have been using a rolling turner, and have had problems with some chicks hatching from the wrong (small) end of the egg, you may find it beneficial to set eggs vertically for the first seven days.

RANDOM/ SAME DIRECTION/ PROGRAMMABLE TURNING

Whilst most domestic fowl-type species have become genetically accustomed to artificial incubation, many specialist or professional breeders realise that they are dealing with eggs where it is most important to replicate the natural nest and its environment, as far as possible. For these, the choice of being able to select the rotational amount of turn, the regularity of the turning and even whether the turning is always in the same direction, or back and forth, gives them an additional and valuable tool in the quest for successful incubation.

All this is very technical fine tuning and probably only worth considering if you are trying to hatch rare, difficult or valuable eggs. Remember - practise has shown that most average chicken/ waterfowl eggs will hatch successfully regardless of whether they are placed horizontally or vertically on the incubator!

THERMOSTAT

A thermostat is the device which senses the heat in the incubator and causes the heater to come on or switch off in order to maintain the pre-set temperature. Nearly all our incubators use electronic thermostats some of which probe the temperature in the incubator many times per second and consequently, switch the heat on or off as required in order to maintain a very stable temperature within the incubator at minimal running cost.

The traditional wafer-type thermostat uses an ether filled capsule which expands under heat to mechanically activate a microswitch. On contracting as the incubator cools, it releases the microswitch, thus switching the heater on again. These are also very reliable and maintain a stable egg temperature even though the air temperature maintains a regular "wave"pattern.

STILL AIR

Still air incubators give out heat from the element which relies on radiation and convection to spread the heat evenly throughout the incubator. These machines have been designed with the air flows correctly worked out to give an even spread of heat. Still air machines have fewer parts to go wrong and will hatch eggs very effectively. They are generally table-top models as it is not possible to have an even spread of heat over more than one layer of eggs, and are thus confined to incubators at the smaller end of the market and some of the medium sized, still-air hatchers. In certain conditions, a still air machine will hatch some eggs better, i.e. with the chicks in a better condition, though not necessarily in higher numbers, than a forced air machine. They are, of course, closer to nature.

FAN ASSISTED / FORCED / CIRCULATED AIR

These incubators incorporate a small fan which circulates the air evenly throughout the incubator cabinet. All cabinet incubators are of this type, together with a few table-top models. Any incubator with more than one tray of eggs must be fan-assisted. In these machines, all types of egg can be incubated at the same temperature as the temperature is the same throughout the cabinet. Generally speaking, the temperature is more accurate as it doesn't depend on the exact sitting of the thermometer.

If your requirement is for incubation of aviary type birds' eggs, where eggs can be different sizes, or at different stages of incubation, then a small, circulated air incubator is to be preferred.

"CONTACT" INCUBATION

"Contact" incubation is a new concept introduced in 2003 by Brinsea Products and only available in their new "Contaq-X8" and "Contaq-X3" incubator. It works on the principle that eggs are warmed from above by a heated-air filled pillow - similar to a broody hen. This is an innovative approach but has shown spasmodic results in trials and needs refinement. It creates a more natural temperature differential from the top to the bottom of the egg, which encourages embryo movement - but this theory is more simply and successfully demonstrated in the **Incatec** incubators.

HUMIDITY

In general, there are more chicks lost by providing TOO HIGH HUMIDITY than by LOW HUMIDITY. We are happy to advise customers on humidity for their incubator and species, though it should be remembered that with eggs from exotic or "wild" species particularly, all eggs are individual and no hard and fast rules can be given.

The purpose of humidity control in incubation is to balance out the natural evaporation of fluid from within the egg as the embryo grows and as air space increases. The correct level can be gauged by air space development (visible on candling) or weight loss between setting and internal piping (by weighing).

For UK customers, the ambient UK relative humidity is usually sufficient for incubation in still-air incubators for most domestic species, without the addition of water, regardless of what the instructions may say!

Circulated air machines may need water because of the drying effect of air movement.

Two main types of automatic humidity are available:

1. Continuous metering of water to an absorbent pad placed inside the incubator, using a peristaltic pump. The humidity is measured electronically and the rate of water supply continually adjusted to maintain the set level. Can achieve levels from marginally below ambient to approx 75% (Max recommended level). This is the type used in the Brinsea unit. With this method reaction to adjustment is quite slow.

2. Ultrasonic generation of water vapour which is projected into the incubator in response to electronic measurement of the humidity level. Very precise control and levels as low as 16% RH can be achieved. Humidity will ramp up to required levels in seconds or down within minutes. Impressive but more expensive. Again, maximum recommended level is 75%. This is the type used on Masalles HS models.

Levels of over 75% RH should not be sustained for any length of time on any auto-humidity unit, as this jeopardises the electronic sensors.

COOLING

Certain species, particularly waterfowl, benefit from a cooling period each day, after a certain stage of incubation. Some incubators offer the facility to programme a cooling period into each 24 hour cycle if required. (The alternative, obviously, is simply to remove the lid or open the door - always remembering to shut it again, of course)

INCUBATOR TERMINOLOGY - MATERIALS

HIGH DENSITY EXPANDED POLYSTYRENE
Incubators made out of this material have excellent insulation properties and consequently run on very low wattages, making them extremely economical to run. They are also the cheapest to buy. Given reasonable care, particularly when cleaning the base, incubators made from this material will give very good service. We have many customers who have used polystyrene incubators for many years of successful hatching and if you do ruin the base with over-enthusiastic cleaning, new bases are available at low cost. Plastic base liners are now available for some of these models, which can easily be rinsed under the tap, preserving the main shell. Incubators of this material are the Hovabator, Ecostat Economy 80 and Therbo Incubators.

EXPANDED STRUCTURAL POLYURETHANE
Not to be confused with polystyrene, this is an excellent incubator material combining the best of all worlds! It has smooth, hard surfaces, excellent insulation properties, easily cleaned (scrubbable) and again results in very low wattage, economical incubation. Probably the most practical type of incubator material on the market. Incubators in this material are: the whole of the Brinsea range (except Octagon 10), the A.B. range and the COVATUTTO 120.

MOULDED FIBRE GLASS
Very smooth surfaced with no seams and smooth corners, these cabinets are exceptionally hygienic, easy to clean, robust and hardwearing. Most Masalles cabinets are made of this material and are double-skinned with an insulating core.

PLASTIC / PLEXIGLASS / PERSPEX
“Plastic Box incubators” tend to be inexpensive to buy initially but in practice a) they are prone to “damage in transit” and b) the thin plastic walls of the boxes mean that heat is lost from inside the incubator and the eggs around the outer edges suffer from a chilling outside the incubator. To compensate, some makers fit a higher wattage element and this results in a higher usage of water for humidity.

Some plastic incubators with specially made mouldings have overcome some of these problems such as the Chicktec 12, Chicktec Smart, Chicktec 50, Octagon 10 and Octagon 20.

Plastic clear-top incubators are suitable for school use, and, generally speaking, plastic machines are easier to clean.

WOOD
Wooden cabinet incubators are usually robust but they have their downside in cleanability because of joints.

Wooden cabinet incubators fitted with ultrasonic humidity should be avoided because of the way this otherwise effective humidity system tends to make the wooden walls swell and become unserviceable.

FIBRE-GLASS FACED WOOD
These are very robust, good-looking incubators. Because of the materials used they are craftsman-made and hand-assembled. The insulation properties fall somewhere in the middle of the range and they are certainly not as economical to run as the polystyrene or polyurethane models. They will give years of service but have nooks and crannies to hinder cleaning out.

OMNITHERM
This is Brinsea Products' successful incubator heating technology using conductive printed ink (rather like a heated rear screen on a car) on a flexible membrane which lines the whole incubation chamber providing very even and gentle heating. Used in Brinsea's Octagon range of incubators and the TLC4.

GENERAL RECOMMENDATIONS

SITING YOUR INCUBATOR
To get the best results from your incubator, you should give some thought to the best place to site it. An un-heated or un-insulated garage or outhouse is rarely a good choice as it is prone to extreme variations of temperature with which no incubator thermostat is designed to cope. The ideal situation is a spare bedroom or other room within the house, out of direct sunlight and away from draughts. Although we fit cooling systems to larger incubators these are not normally fitted on smaller machines. Incubators rely on a lower ambient temperature to maintain their steady control. If room temperature is likely to be high install a small air-con unit.

Remember - if you are comfortable with the room temperature, then your incubator should be too! Ensure that the base of the incubator is clear from obstructions, to allow free passage of air for ventilation. Please note that, to comply fully with British Standard BS EN 60335-1/2, a domestic incubator should be sited at least 500mm from the floor and animals.

STORAGE OF HATCHING EGGS

We are often asked how long hatching eggs can be stored before incubation. There is no hard and fast answer to this. No fertile egg reaches a cut-off point beyond which it will not hatch, but hatchability will decrease gradually at a rate of about 2% per day after the first two days. Ideally eggs should be incubated within a week of laying but many people successfully hatch eggs stored longer than this. Eggs stored for incubation within a week should be placed narrow end upwards at a temperature of 15°-18°C. If stored longer than this, the temperature should be reduced to around 12°- 15°C, tilting the egg tray daily by propping it up at alternate sides, placing the tray inside polythene bags. If your storage conditions are just right, you should have no trouble with spiders - it will be too cool and damp!

For larger and / or professional establishments, temperature-controlled egg storage cabinets are available, with or without turning.

CLEANING OF HATCHING EGGS

If you are hatching only your own eggs and they are visibly clean, then it is not usually necessary to wash the eggs, as, by doing so, you will destroy the natural cuticle on the shell.

However, dirty eggs or eggs from unknown sources, should be washed in a proprietary egg sanitiser. It is essential that the water is warmer than the eggs, so that any bacteria are drawn away from the pores in the egg shell. If the water is cooler than the egg, bacteria can be drawn in to the shell. Eggs should then be allowed to drain and dry naturally.
Never, ever put soiled eggs in an incubator without cleaning and sanitising them first. An incubator provides ideal conditions to multiply bacteria!

SETTING

Make sure the incubator is running consistently and at the correct temperature before setting eggs. Ideally, eggs should all be the same temperature when set in an incubator***** so please do not set fresh laid eggs together with stored eggs. This would result in a spread-out hatch. It is best to keep all eggs in a cool place for at least 24 hours before setting and then bring them into the incubation room to come up to room temperature before setting.

If setting vertically, set with the broad end of the egg pointing up.

*****The exception to setting fresh eggs is, of course, when transferring a partly incubated egg from the nest to the incubator. This is more common for cage and aviary birds, parrots and birds of prey. These eggs do benefit from being initially incubated by the parents.

Once the colder eggs have been placed initially in the incubator, the temperature in the incubator will drop and then rise slowly as the eggs warm up. Provided that the incubator had been operating correctly at the right temperature before the eggs were put in.

DO NOT ADJUST THE TEMPERATURE UNTIL THE EGGS HAVE COME UP TO HEAT.

SUMMARY

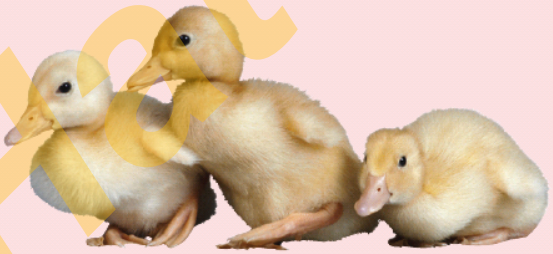
Although we have noted the pros and cons of different types of incubator, usually all of them are capable of giving excellent results if you follow the manufacturer's instructions. There is also one other point we could make at this stage; all incubators are guaranteed for at least one year (sometimes more), so if you should be unfortunate enough to find a fault develops, or maybe you can't seem to get it to work properly when you receive it, please phone for advice, don't make any alterations or try to mend it yourself, as by doing so, you will invalidate the guarantee! All the manufacturers we represent are very good at getting spare parts to you when necessary and in many cases, we carry spares in stock ourselves and sometimes all it needs is a little advice or explanation!

THERE ARE SOME MANUFACTURERS OF INCUBATION EQUIPMENT WHOM WE HAVE CHOSEN NOT TO REPRESENT, FOR ONE OF SEVERAL REASONS, USUALLY OUR CONCERNS ABOUT TECHNICAL SAFETY OR PERFORMANCE, DURABILITY OR WARRANTY BACKUP.

The following table gives wet bulb temperatures which relate to percentage relative humidity. (The figures assume a dry bulb incubation temperature of 37.5°C/99.8°F.)

RH level (%)	WB Temp °F	WB Temp °C
20	69.1	20.6
25	71.6	22
30	74.1	23.4
35	76.5	24.7
40	78.8	26
45	80.8	27.1
50	82.9	28.3
55	84.9	29.4
60	86.7	30.4
65	88.5	31.4
70	90.1	32.3
75	91.9	33.3
80	83.6	34.2
85	95	35
90	96.6	35.9
95	98.1	36.7
100	99.5	37.5

If the incubation temperature is different to 37.5°C, compensate by adjusting the wet bulb thermometer accordingly. For example: if using the incubator at 36°C with a wet bulb temperature of 26°C, calculate the RH level using the 27°C wet bulb temperature: = 46%. **Note that the wet bulb thermometer will read thr same as the ordinary (dry bulb) thermometer either at 100% RH or, more probably, when the wick dries out.**



Useful temperature conversions, °F to °C

°F	°C	°F	°C
90	32.2	97.5	36.3
90.5	32.5	98	36.6
91	32.7	98.5	36.9
91.5	33.0	99	37.2
92	33.3	99.5	37.5
92.5	33.6	100	37.7
93	33.8	100.5	38
93.5	34.1	101	38.3
94	34.4	101.5	38.6
94.5	34.7	102	38.8
95	35	102.5	39.2
95.5	35.2	103	39.4
96	35.5	103.5	39.7
96.5	35.8	104	40.0
97	36.1		