Brinsea

The Incubation Specialists

PRESS INFORMATION

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Contact Incubation – A radical approach to better egg incubation

The search for better hatch rates through a better understanding of natural incubation.

Small-scale artificial egg incubation can be a fairly 'hit or miss' affair – particularly with wild and undomesticated species. The number of fertile eggs that hatch can vary greatly between clutches with no apparently good reason. Brinsea Products research department has been actively investigating shortcomings in conventional incubation techniques and ways to improve the artificial incubation process to give better hatching reliability.

The problem

- Despite decades of development, incubators still hatch less well than birds.
- Wild and undomesticated birds are *much* better at hatching eggs than the best machines.

What distinguishes the incubator from the nest environment?

- There is much greater variability in nest temperature than would ever be acceptable in incubators.
- All current incubators surround eggs with warm air. No birds incubate eggs this way.

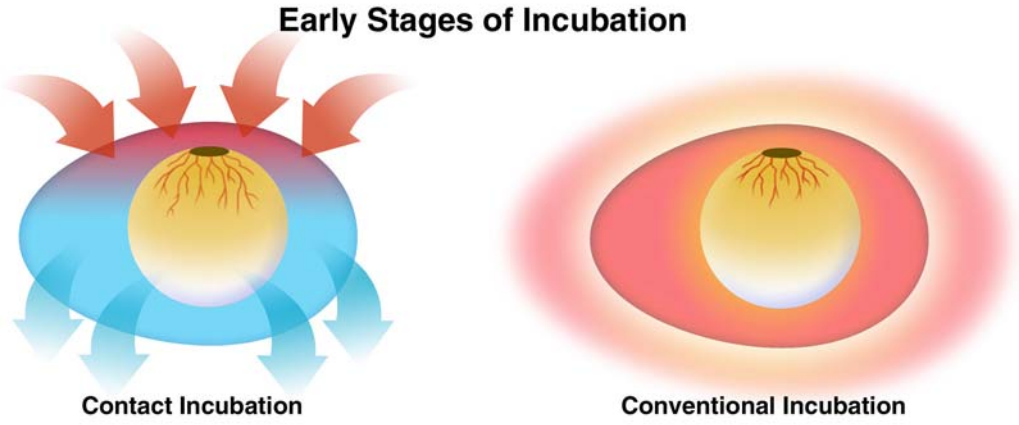
What can we conclude from these observations?

There is clearly a fundamental difference in the way that an egg responds in an incubator compared with incubation under a bird. Warming by contact is the most obvious distinction between the artificial and natural processes. Eggs in nests are warmed by contact with the brood patch of the parent which is often plucked bare by the bird before incubation. The effect is that an area on the top of the egg is warmed and the rest of the egg is at a lower temperature – particularly the bottom of the egg, which can be as much as 10°C cooler than the top.

In fan assisted incubators the egg is warmed from all around at an even temperature – which makes control and measurement easy for the operator but is very different from the nest.

On the face of it, the distinction between contact warming and all round warming may not seem significant but when the thermo-dynamics of the developing embryo are understood the significance of these differences becomes clearer. Important research carried out by J. Scott Turner at the New York State University and the University of Cape Town has revealed major unsuspected differences in the thermal behaviour of eggs incubated by contact rather than by conventional incubators.

Illustration 1 shows the movement of heat within the egg in early stages of incubation. When warmed by contact the egg is experiencing a flow of heat from the brood patch which is dissipated through the egg to the remainder of the shell. By contrast, once up to incubation temperature, the egg incubated in a conventional incubator experiences no heat flow in early stages, either into or out of the egg, because it is warmed evenly over the surface of the shell and is at the same temperature as the air around it.



This temperature uniformity is increasingly viewed as being significant, though the reasons are debatable. It may be that early development of blood vessels in the lower regions of the egg benefit from a cooler temperature. Certainly, the early days of incubation appear particularly sensitive to the way the egg is warmed. The blastoderm (the disc which develops into the embryo) sits on the top of the yolk of the fertilised egg and is maintained in this position by gravity – if the egg is rolled the yolk will gradually rotate and restore the disc to the top.

Therefore the disc is always close to the source of warmth of the parent bird. Within the first few days of incubation blood vessels form in the membranes inside the eggshell. These start from the blastoderm and grow to gradually envelop the contents of the egg. The rate and extent of this development is known to be effected by temperature as well as egg turning.

One effect of this developing network of vessels is to transfer heat from the brood patch to the rest of the egg increasingly, as incubation progresses. Consistent temperature around an egg interferes substantially with the embryo's ability to control its own temperature later in incubation when the embryonic blood circulation should act as a heat transfer fluid, carrying away increasing metabolic heat to cooler shell areas. This lack of heat flow in artificial incubation is associated with the poorer hatching results, particularly of wild species.

The history of artificial incubation gives clues to the current state of affairs. A small number of species, domestic fowl, turkeys, ducks, etc., have been artificially incubated over many generations and in vast numbers, leading to artificial selection in favour of eggs which hatch successfully in conventional incubators. As commercial incubators have got larger with more uniform control, the birds, too, have adapted to suit. Applying the same technology to wild or undomesticated birds, which have not been subjected to the same artificial selection, is much more 'hit and miss'.

Incubation of species which have not been subject to the genetic manipulation of industrial artificial incubation needs a fresh and more considered approach.

Brinsea Products have initiated field trials to test the idea of contact incubation in practice. Data from these trials as well as further details of the Contact Incubation principle is available by registering on their website: www.brinsea.com.

Brinsea Products Ltd. is the UK's leading designer and manufacturer of small scale incubators, hatchers and accessories, with exports now accounting for over 65% of Brinsea's production.