What is the secret to making a great hatchery?

What makes a hatchery great? This is the question everyone involved with incubating poultry eggs wants to know, whether they are hatching chickens, turkeys, ducks, geese, or pheasant, etc. This question applies to all: those trying to hatch eggs in small tabletop incubators at home, school science classes or youth projects, or for-profit operations on a small farm site.

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People want to know the secret to incubating eggs and, of course, this is of particular importance to those involved in commercial incubation with large-scale hatcheries, as profit margins are often very small, so efficiency is of utmost importance.

Obviously, purchasing and properly operating the right equipment is of great importance for getting the most out of the hatchery itself and absolutely should not be neglected. However, aside from the incubation equipment, the facilities of the hatchery, and making sure they all have the right settings and are operating at their peak, there are basic principles that must be managed to get the quality chicks desired.

Before a hatchery can be successful, the basic input of the hatchery, quality fertile hatching eggs, must be made a priority. The two most essential components to a successful hatchery are:

- An excellent breeder programme.
- Hatching egg management.

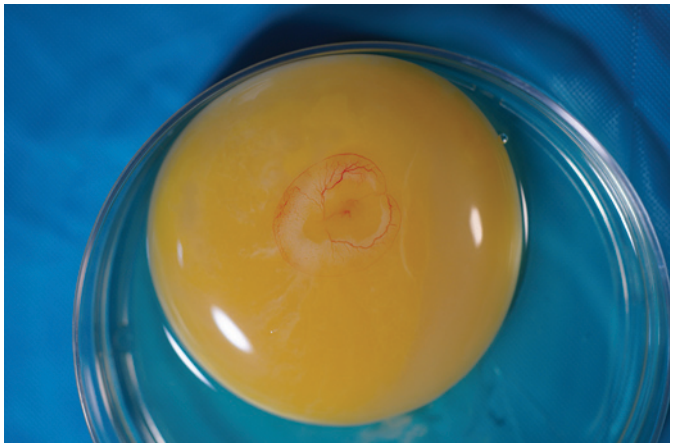
Excellent breeder programme

What is the single most important criteria for a successful hatchery? The eggs must be fertile. This sounds simple and obvious, but it is true. As the saying goes 'You can not hatch an infertile egg'.

The successful hatchery begins with fertile eggs, as they set the maximum limit to what can be achieved in the hatchery. Every other area of the hatchery is based on these pre-set limits and their success is completely dependent upon the breeder programme and the hatching potential of the eggs delivered to the hatchery.

Obviously, the other areas in a successful hatchery should not be ignored, but the first and most critical area is the quality of the inputs to the hatchery, and the inputs are the hatching eggs. Fertile hatching eggs that are properly cared for to preserve their hatching potential, will set the limits for the rest of the hatchery.

The breeder programme is the first key to a successful hatchery. It has been said many times 'You can have an excellent breeder programme and a bad hatchery, but you can not have a bad breeder programme and an excellent hatchery'. This just does not happen for several reasons.



Obviously, infertile eggs simply will not hatch, regardless of any herculean efforts in any of the other six areas of importance.

In my 25 plus years of hatchery/breeder experience I can not think of a single hatchery that was pleased with their performance, that was not backed up by an equally strong breeder programme.

One of the reasons for this is that when flock fertility starts to drop because of infrequent mating, which is often the case in aging breeder flocks, embryo mortality will also increase.

So, when fertility is depressed in older and/or less fertile flocks, even the eggs that are fertile will not hatch as well due to poor embryo viability.

While hens have the physiological capacity to store sperm in vivo in sperm storage tubules in the utero vaginal region of the oviduct, the viability of the quality of the sperm will decrease the longer it is stored.

When mating frequency is decreased, fertilisation of the hen's ova can continue to occur for up to three weeks (this varies between avian species). However, the stored sperm and egg do not always produce an embryo with the same vitality as occurs with frequent mating or insemination.

Research has shown that after the tenth day after a single mating (in chickens) fertility will drop and as high as 50% of the fertile eggs will die during incubation.

To further compound this, research has shown that hatched broiler chicks from older flocks with fertility problems due to infrequent mating will have lower initial body weight, lower 14-day livability and generally poor performance. These are all factors that are attributed to hatchery performance.

Additionally, if a breeder programme is struggling to get fertility out of the birds, this is often a sign that the birds themselves are not managed in other areas to enable them to produce at their peak levels.

Areas such as egg production, hatching egg quality (shell and contents), and egg handling are often not as would be expected.

The genetics companies have done an excellent job in selecting for the best and most profitable birds for the processing plant and, while these birds are still as reproductively fit as previous generations, it is often more of a challenge to manage the current birds to achieve the desired results.

Hatching eggs are the input we must control in order to maximise hatchability and chick quality.

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Hatching egg management

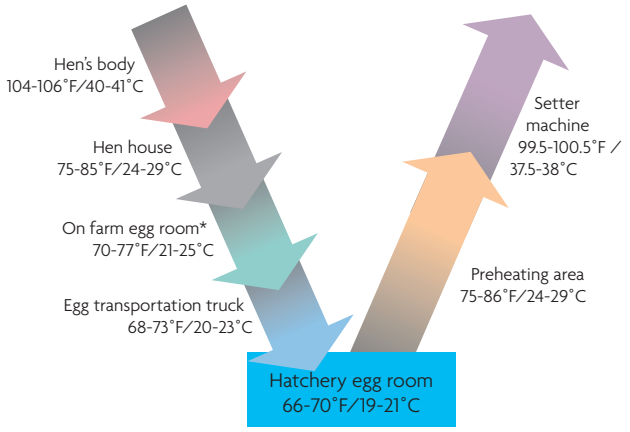
While obtaining fertile hatching eggs is the most important factor to a successful hatchery, hatching egg management is the second key factor because how these hatching eggs are cared for from the farm to the hatchery incubator is extremely important.

At the time an egg is laid, its maximum hatching potential is determined. There is nothing that can be done after the egg is laid that can improve its potential to produce a viable chick. The best that can be hoped for is to maintain its hatching potential during the process and the time the eggs are stored prior to initiation of embryo development in the incubator. However, if the fertile egg is not cared for correctly from the time it is laid until artificial incubation is initiated, the hatching potential can be reduced, and quite dramatically at that.

Fig. 1 shows the recommended temperature ranges for hatching eggs to maintain their hatchability. The principle is that eggs should undergo only two temperature changes from the time of lay to the time of incubation.

After the time of lay, each succeeding stage of the egg handling process should be 1-2°F lower than the previous area until the eggs reach the hatchery egg storage room. Avoiding temperature fluctuations along the way will reduce stress on the embryo during storage and maximise its hatchability.

It should be noted that during each area in the process (on-farm storage, transportation truck, hatchery egg storage), the temperature should be as stable as possible.



*Lower temperature for eggs stored at the farm. Higher temperature for eggs transported to the hatchery daily. While the industry recommends storage temperature of 20°C, actual on-farm storage temperature can range from 15.6-23.9°C.

Fig. 1. Egg temperature flow chart (for fresh eggs).

Research has shown that for eggs to be incubated within 8-10 days after lay, fluctuations in egg handling and storage temperatures of as little as 2°F can cause from 2.5-3.5% loss in hatchability.

To maintain the egg hatching potential during egg handling (all areas of storage and transport), preventing temperature fluctuations the eggs are exposed to is critical.

Other areas of egg management that are also important are managing the egg pack (hatching egg quality, size, shape, cleanliness, etc). Again, the hatching egg potential has been mostly fixed, but poor-quality hatching eggs should be removed from the flats as they will be a detriment to chick quantity and quality.

Establishing a set of criteria for what is an acceptable hatching egg and ensuring all personnel understand this will improve overall hatchability. Small eggs often do not hatch as well and will produce small chicks that will often struggle to compete with the larger chicks.

Embryos within eggs that are either 'too round' or 'too oblong' will struggle to orient themselves properly and will struggle to hatch, or will not hatch at all. Those that do hatch will have been stressed and likely will not perform well as they mature.

Misshaped or slab-sided eggs often have thin shells and will lose too much moisture. They are also often less fertile and prone to contamination. Dirty and soiled eggs will add a source of contamination to the incubator and will often further contaminate the other eggs or chicks in the incubator cabinet. Even if the dirty eggs hatch, chick quality will suffer greatly.

Additionally, to further control the inputs into the incubators, manage egg set times to keep eggs fresh and machines balanced with the eggs set in each machine.

The incubators will operate much smoother with fewer micro-climates within the cabinet if the egg sets are balanced and managed according to the equipment manufacturer's guidelines.

A balanced egg set will help to reduce the microclimates and narrow the hatch window, which will improve chick quality.

Summary

Modern day hatchery managers have demands on their time coming from many different areas. While these other demands may all be important for overall hatchery operations, managing the quality of the inputs (hatching eggs) remains the most important.

While the two areas in this article are not covered in depth, it is necessary to make sure each of these areas remains a focus to improve overall hatchery operations.

Remember, what we put in our incubators will largely determine what we can possibly take out at the end. Proper incubation procedures and activities will allow the best possible embryonic development and will produce the best possible quality chicks.

After the chicks hatch, how they are then cared for will contribute to their performance in the poultry house.

At each step in the process, we can not usually correct what has already happened, but what does happen next can be affected by what we produce. ■