

# Ultraviolet water treatments – getting the basics right

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There have been a number of incidences where a bacterial infection in day old chicks has been traced back to the hatchery water supply. The most likely route of infection is the humidity spray in either or both the setters or hatchers.

Humidity systems may be either:

- 1 Simple spray nozzles linked to a humidistat.
- 1 High pressure atomising systems linked to a humidistat and interval timer.
- 1 Paddle wheel or discs rotating in a tank of water.
- 1 Steam generators.

All except the last present a potential problem in that if water is contaminated before it enters the hatchery, the contamination will be spread around within the machines by the action of the spray system.

A further problem exists with the systems using tanks of water. This water can become contaminated very rapidly, and bacterial growth at incubation temperatures can be very rapid. Steam generators are likely to be safest from the bacterial point of view, but are less popular due to the energy costs of operating them.

Water purification using chlorine has been

accepted as the method of choice for many years. But there are disadvantages with it in that the low levels of chlorine used may not eliminate high bacterial levels. Adding additional chlorine increases the corrosive nature of the water, to the detriment of the humidity sprays or paddles.

## Alternative method

An alternative method of disinfection is to use ultraviolet light. Water is disinfected by exposure to light from low pressure mercury lamps.

These generate an ultraviolet ray of 254 nanometers which destroys all micro-organisms.

UV light systems for water treatment should have a number of safeguards built in to ensure effective treatment of all the water which is used:

- 1 Most important is to ensure that no water can by-pass a treatment unit either by a by-pass pipe or by back syphonage.
- 1 The intensity of the UV unit must be

matched to the maximum flow rate.

1 An automatic cut-off valve should close off water flow if UV intensity falls below an effective level, or on failure of the lamps.

Once a system has been installed maintenance is minimal, although certain operations will need to be carried out:

- 1 Bulb replacement according to the manufacturer's instructions.
- 1 Filter maintenance, as particles in the water can protect bacteria from the ultraviolet light, and so ultraviolet installations usually combine a filter system to remove particles before treatment.

1 Cleaning of the quartz tube which surrounds the ultraviolet bulb which sometimes becomes dirty and reduces light transmission.

Table 1 shows a comparison of water disinfection using ultraviolet, chlorine and ozone.

UV light emissions are harmful to the human eye and an exposed tube should not be switched on. Eye protection should be worn – either goggles or a full face visor. ■

**Table 1. A comparison of water disinfection using ultraviolet, chlorine and ozone.**

	Ultraviolet	Chlorination	Ozone
Capital cost	Low	Lowest	High
Operating cost	Lowest	Low	High
Ease of installation	Excellent	Good	Complex
Ease of maintenance	Excellent	Good	Poor
Cost of maintenance	Low	Low	High
Frequency of maintenance	Very infrequent	Frequent	Continuous
Disinfection performance	Excellent	Some regrowth possible	Unreliable in effluent
Virucidal effect	Good	Poor	Good
Personnel hazards	Low to none	High	High
Toxic chemicals	No	Yes	Yes
Effect on water	None	Forms trihalomethanes	Toxic by-products
Residual effect	No	Yes	Some
Problems with operating systems	Low	Medium	High
Contact time	1-5 seconds	30-60 minutes	10-20 minutes
Ease of handling varying flow rate	Excellent	Poor	Good