Continued From Last Month . . .

HATCHING EGG HYGIENE

- Systems currently in use in the hatching egg production cycle make it impossible to avoid some shell contamination. Even eggs that appear clean can be contaminated by bad practice. The following points suggest methods of reducing contamination.
- Frequent collection of hatching eggs should be made to remove them from the area of contamination as quickly as possible.
- Eggs should be handled and stored under strict hygiene conditions. Hand washing facilities should be provided

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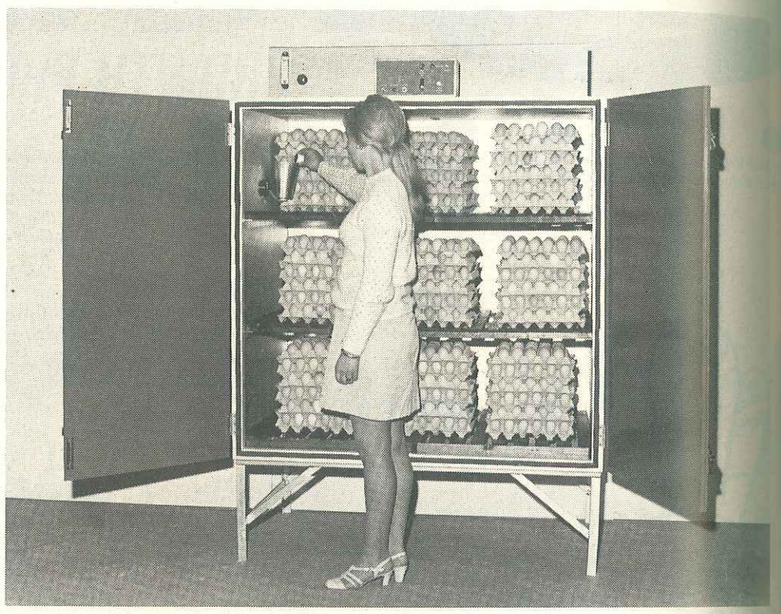
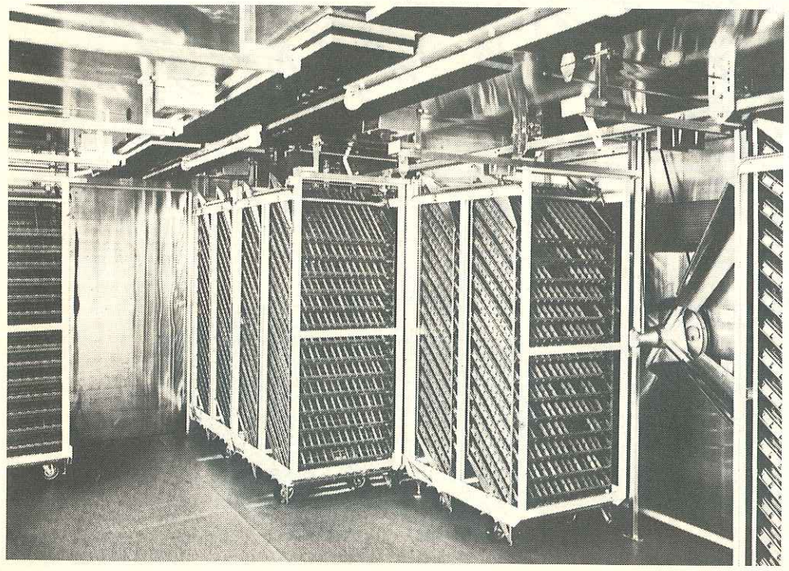


One way of treating hatching eggs after collection is to fumigate them with formaldehyde gas in a specially designed cabinet. (Photograph by courtesy of Western Incubators)



If micro-organisms are given time to penetrate the eggs' natural defences, the humid warmth of the incubator will encourage their proliferation inside the eggs. (Photograph by courtesy of Pas Reform)

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on the farm and personnel made aware of the implications of bad egg hygiene. Hatching eggs should be stored in a room separate from the area in which they are packed and sorted.

- Floor eggs should be treated separately. An entirely separate collection should be made, preferably with gloved hands, using containers employed only for floor eggs. They should then be graded, packed and stored apart from eggs collected from nests.

Treatment of potential hatching eggs with a disinfectant should be carried out as soon as possible after collection, since invasion of the shell and subsequently the developing embryo is a continuous process. The natural defence mechanism of the egg quickly becomes overloaded and fails. There are two methods of treatment in use at the moment (1) gaseous fumigation, and (2) immersion in a disinfectant fluid. Either method can be effective if the correct procedures are followed but, equally, both methods can be harmful if abused.

Igiene Delle Uova Da Cova

Riassunto—Le uova da cova dovrebbero essere raccolte frequentemente, maneggiate e immagazzinate sotto condizioni igieniche e immediatamente disinfettate per impedire ai batteri di penetrare nei gusci e interferire con lo sviluppo degli embrioni. I due metodi più comuni di disinfezione sono (1) la fumigazione gassosa e (2) l'immersione in disinfettante liquido.

Per il primo metodo occorre un ambiente particolare a tenuta ermetica. Normalmente viène usato gas di formaldeide, generato sia mescolando formalina liquida con permanganato di potassio, sia scaldando della paraformaldeide in forma solida. Il sistema è pulito ed efficiente, ma fa anche perdere tempo e, se non viene effettuato correttamente, è pericoloso per l'operaio. La concentrazione gassosa è il punto critico e la tecnica richiede un alto livello sia di umidità che di temperatura.

La disinfezione comporta l'immersione delle uova in un disinfettante fluido per un periodo determinato e ad una precisa temperatura. Vari disinfettanti possono andar bene, ma il cloro è il più indicato per efficacia e basso costo. E' a suo sfavore il grande volume d'acqua che deve essere riscaldato ad una temperatura controllata.

Bruteierhygiene

Zusammenfassung—Bruteier sollte man oft absammeln, unter hygienischen Voraussetzungen handhaben und lagern und prompt desinfizieren, damit Bakterien nicht durch die Schalen eindringen können. Zwei Methoden der Bruteierdesinfektion werden am häufigsten eingesetzt: 1. Begasung und 2. Eintauchverfahren in ein Flüssig-Desinfektionsmittel.

Für die erste Methode benötigt man eine luftdichte Spezialkammer. Im allgemeinen wird Formaldehydgas verwandt, das entweder durch Vermischung von Flüssigformalin mit Kaliumpermanganat oder durch Erhitzen von festem Paraformaldehyd erzeugt wird. Bruteierbegasung ist ein sauberes und wirksames Verfahren, es ist aber auch zeitraubend und, sofern nicht sachgemäß gehandhabt, für die damit umgehende Person gefährlich. Die Gaskonzentration ist ein kritischer Faktor; die Begasungstechnik erfordert sowohl hohe Temperaturen wie auch hohe Luftfeuchtigkeitspegel.

Beim Eintauchverfahren werden die Bruteier in eine Desinfektionslösung eingetaucht. Eintauchdauer und -temperatur stehen fest. Verschiedene Desinfektantien eignen sich für dieses Verfahren—Chlor dürfte aber was Wirksamkeit und Billigkeit anbetrifft wohl die beste Wahl sein. Das Problem bei diesem Verfahren: große Wassermengen müssen auf eine kontrollierte Temperatur erhitzt werden.

L'Hygiène Des Oeufs A Couver

Sommaire—Les oeufs à couver doivent être ramassés fréquemment, manipulés et stockés dans des conditions hygiéniques et désinfectés rapidement pour empêcher les bactéries de traverser les coquilles et d'interférer avec le développement des embryons. Les deux méthodes les plus populaires de désinfection: 1) la fumigation au gaz et 2) l'immersion dans un liquide sanitaire.

Pour la première méthode, il faut une pièce étanche spéciale. On utilise généralement du gaz formaldéhyde et on le fabrique soit en mélangeant de la formaline liquide avec du permanganate de potassium soit en chauffant de la paraformaldéhyde solide. Ce système est propre et efficace mais il faut du temps et si ce n'est pas bien fait, il est dangereux pour l'ouvrier. La concentration gazeuse est délicate et cette technique exige à la fois une température et un niveau d'humidité élevés.

La méthode par trempage demande qu'on plonge l'oeuf dans un liquide désinfectant pendant un temps déterminé et à une température donnée. Plusieurs désinfectants sont utilisables mais la chlorine est excellente pour son efficacité et son bas prix. Contre cette méthode, il faut chauffer des volumes importants d'eau à une température donnée.

The eggs are exposed to formaldehyde gas in a special fumigation chamber. The gas can be generated either by mixing liquid 40% commercial formalin with potassium permanganate crystals, or by heating paraformaldehyde powder. Both methods are effective but, for maximum efficacy, require a temperature of 23-24°C with a relative humidity of 79%.

Advantages of fumigation are as follows:—

- It is cheap.
- Most bacteria are susceptible to formaldehyde.
- It is a good surface disinfectant.
- Accidental over-exposure at this stage is not harmful.

Disadvantages of fumigation include:—

- The gas does not penetrate to the interior if eggs are packed in fibre trays.
- For the treatment to be effective, each batch of eggs must be fumigated immediately after collection. This necessitates frequent changes of gas.
- The method is time-consuming, each cycle taking up to 60 minutes.
- If potassium permanganate is used a violent chemical reaction occurs, representing a serious fire risk.
- It is a dangerous, obnoxious gas which causes unpleasant effects in human beings if inadvertently inhaled.

For this system to be completely effective, the concentration of gas is critical. At the end of a 20-minute fumigation period 600 milligrams of gas should be present per m^3 of space. The efficacy of fumigation is demonstrated by trials conducted in the UK in 1969.

Treatment consisted of 21 ml of formalin per m^3, using a sample of 24 eggs. The quality of the sample immediately after collection was such that the number of bacteria obtained by surface swabs on the shells was quite uncountable. After one treatment, only 11 micro-organisms were found per cm^2, and after a second treatment the bacterial population of the eggshells was less than one per cm^2.

In a second experiment involving 24 eggs fumigated at double the gaseous concentration, again the pre-treatment surface swabs produced an uncountable number of micro-organisms. But after the double strength formaldehyde used once only, the bacteria count was a mere five organisms per cm^2.

This method involves dipping eggs in a disinfectant fluid for a set time at

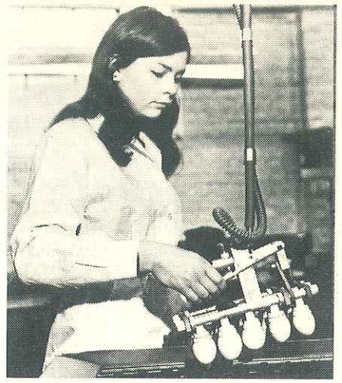
a set temperature. Various disinfectants can be used, such as quaternary ammonium, chlorine and iodine compounds and sodium pentachlorophenate. Of the four, chlorine is the most suitable since it is non-toxic, cheap, effective and easily measured colourmetrically.

The advantages of immersing eggs in chlorine solution are:—

- The entire shell surface is treated quickly.
- Small batches of eggs can be dealt with promptly after collection.
- It is non-toxic, even at twice the recommended concentration.
- The strength of the chlorine solution can be easily measured by using colour comparisons.
- It is inexpensive.

The disadvantages of immersing eggs in chlorine solution include:

- Gross contamination of large numbers of eggs if the correct conditions of temperature and particularly dilution are not observed.
- Large volumes of water have to be heated to a controlled temperature and subsequently disposed of.
- Only apparently clean eggs can be treated because organic matter quickly inactivates the chlorine.



After the eggs have been fumigated or sanitised, every effort must be taken to ensure that they are not recontaminated during handling in the hatchery. (Photograph by courtesy of Ben Nevis)

Chlorine solution at a concentration of 500 ppm at 32°C for ten minutes is a very effective method of treatment. A tank in which the temperature can be controlled and the water circulated is an essential piece of equipment. Chlorine is corrosive to most metals, and stainless steel is the only metal which will stand up to the chemical for long periods.

The efficacy of immersing eggs in a chlorine solution is demonstrated in the following trial summary.

Treatment: 250 ppm chlorine at 42°C for ten minutes.
Sample size: 36 eggs.
Result: From 34 eggs, no bacteria were recovered. One egg gave 6 organisms per cm^2 while the other gave 4 organisms per cm^2.

Here are the results of another experiment using chlorine solution at double strength:—

Treatment: 500 ppm chlorine at 32°C for ten minutes.
Sample size: 24 eggs.
Result: The following organisms were recorded per square inch of shell (6.45 cm^2):—

0	1	0	2
0	4	0	0
0	2	1	3
0	0	6	9
0	3	3	2
1	1	3	6

If, after on-farm treatment in chlorine solution, the eggs are promptly fumigated on arrival at the hatchery, then the shell surface is virtually sterile.

Fifty eggs, treated by immersing in a chlorine solution of 500 ppm at 32°C for ten minutes, were then fumigated once using 21 ml of formalin per m^3. The following organisms were recorded per square inch (6.45 cm^2):—

0	0	0	0	0
0	0	0	1	0
0	0	0	0	0
1	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	2	0
1	0	0	0	0

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The need for hatching egg hygiene is a strong argument in favour of keeping breeders in cages. (Photograph by courtesy of Lohmann)

Without a high standard of egg hygiene it is not possible to achieve high levels of hatchability and chick health. (Photo by courtesy of the US Navy)

Hatching Egg Hygiene

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As with any decontamination procedure, the risk of recontamination is ever present. Care must be taken at all times, particularly when eggs are handled. After dipping in chlorine, dirty hands, trays or boxes would soon result in recontamination if the eggs were handled when wet. Equally, foul air being drawn into a fumigation cabinet as the fumigant is extracted would also cause recontamination.

The hen lays her eggs in a sterile condition. If we fail to carry on where the hen leaves off, then it can only be to our cost in terms of fewer, weaker and less healthy chicks—and we only have ourselves to blame.

(All the experimental results in this article are published by courtesy of Scientific Agribusiness Consultants International, and the feature itself is reproduced by kind permission of the Cobb Breeding Company—Editor)

New Broiler Disease

Drs. Merrill Ranck and D. H. Wallace, Southern Indiana Dubois Laboratory, USA, have reported the discovery of a new thermophilic fungus, first found as a pathogen of turkeys in 1962 and again in 1971 in South Carolina. It has now been isolated from a group of two-week-old broilers.

The research team said the chicks were presented to the laboratory showing clinical signs of encephalitis. Chicks that were necropsied had gross brain lesions suggestive of encephalomalcia or possibly an aspergillosis infection. Microscopic examinations of tissues revealed a fungus infection and cultures from the brains revealed an unidentified mycotic growth. Cultures were sent to the Centre for Disease Control at Atlanta and were indentified as *Dactylaria gallopava*.

Limited experimental inoculations, using day-old chicks, have reproduced the disease. Inoculated chicks have shown encephalitis, similar to the chicks from which the original isolation was made, as well as conjunctivitis and respiratory signs, the scientists report.

The disease may be confused with encephalomalacia caused by Vitamin E deficiency, aspergillosis, or possibly avian encephalomyelitis (epidemic tremor). A laboratory diagnosis is needed to differentiate between these diseases. The fungus is usually found in old sawdust. The chicks, from which the fungus was isolated, had sawdust for litter.

New Technique Speeds MD Vaccine Production

A laboratory technique for producing the vaccine that protects chickens against Marek's disease increases output per cell culture as much as 30 times over the yield of the conventional method.

The cost of the conventionally produced vaccine is high because of the low yield of virus from cell culture, and the elaborate techniques necessary to preserve the virus and administer it to chickens. The new technique, which could be adapted to commercial use, would reduce the cost. Laboratory and field trials have demonstrated the purity, potency, and effectiveness of a herpes virus isolated from turkeys in preventing Marek's disease.

The technique was developed by veterinarian Cellidonia Garrido of the Laboratorio de Patologia Aviaria, Cuidad Obregon, Mexico, microbiologist William Okazaki, veterinary medical officer H. Graham Purchase, chemist Lucy F. Lee, and biologist Ben R. Burmester, all of the ARS Regional Poultry Research Laboratory, East Lansing, Michigan, USA.

The new virus production method is based on the fact that the number of cells growing on a surface can be greatly increased by addition of cells to an already established monolayer. Most of the added cells settle down and grow among the cells already present, forming a layer several cells thick. The virus is currently produced by a monolayer cell culture technique.

Start Chicks At Lower Temperature

A change in chick brooding temperature recommendations is called for, according to University of Wisconsin scientists in the USA. Research by Ron Haller and Milton Sunde indicates that temperatures should be cooler to start with, and reduced a little more slowly than has usually been recommended in the past.

Their research in the university's controlled light and temperature facilities indicates the best starting temperature is about 30 °C, compared with 35 °C as formerly recommended. It is also best to maintain the starting temperature for three weeks, rather than dropping it 5 to 7 degrees each week.

For the fourth week, a temperature of 27 °C is best, followed by 24 °C for the fifth week. Some previous recommendations have called for temperatures about 5 to 10 degrees cooler than the new recommendation, but the old rule of thumb resulted in about the same temperature as the new recommendation for this later brooding period. Lowering the brooder temperature too early results in decreased feed efficiency, due to the need for additional feed to provide body heat.

Chicks started at temperatures higher than 35 °C had an average gain of around 125 gm for the first two weeks. Those started at lower temperatures (27-30 °C) gained an average of 140 to 155 gm over the same period (a difference of 27 kg per 1000 chicks at this age, and over 90 kg per 1000 birds at five weeks of age). Feed efficiency did not differ significantly between these temperatures.