

stored for five to six days, but that with eggs stored for more than six days there is a steady decrease in hatchability for every extra day of storage. Accordingly, poultrymen are strongly recommended not to hold hatching eggs for longer than ten days unless exceptional circumstances force them to do so. Eggs older than ten days will hatch, but a definite loss in hatchability must be expected.

(2) Conditions Affecting Eggs When Stored.

Closely connected with the length of time that eggs may be held for incubation comes the question of the conditions under which such eggs should be stored. The chief factor affecting fertile eggs which are held for hatching is temperature. **Contrary to common opinion, low temperatures are far less harmful than high or even medium temperature.** In a fertile egg the germ may begin to develop at a temperature of 60 deg. F.—an ordinary comfortable room temperature. Thus, eggs subjected to this or higher temperatures during the day and lower temperatures at night may easily show a decrease in hatchability as against eggs maintained at a lower temperature throughout the day and night.

Unfortunately, no investigational work has been completed which fixes the danger point for low temperatures. It has been demonstrated that subjecting hatching eggs for three successive nights to a temperature just above freezing point did not reduce hatchability. If, however, eggs are allowed to freeze the result is usually a burst egg.

To sum up, poultrymen are advised to maintain a temperature of about 50 deg. to 55 deg. F. in the room used for holding hatching eggs, and to avoid allowing the temperature to rise above 60 deg. F. for any appreciable time. Such conditions appear to be the ideal. It is obvious from these suggestions that there is an advantage in collecting eggs from the laying shed as often as practicable, say, three times daily when possible.

Apart from temperature, currents of air affect hatching eggs. A heavy current of dry, warm air, or even cool air (that is, a draught) passing over hatching eggs will remove moisture, more especially from any eggs with porous shells. This must be avoided if good hatchability and the best class of chick is required.

(3) The Position of a Stored Hatching Egg.

Where eggs are stored for not more than ten days the position in which the egg is kept appears to be immaterial. If kept for longer than ten days, the practice should be to place the eggs on their side and to turn them daily. Turning hatching eggs when

they are held for only ten days has not been proved to be essential, but is a safeguard against damage being done to the germ.

(4) Clean Eggs Wanted—Not Cleaned Ones.

Eggs for incubation purposes should not be washed, but any dirt on the shell should be scraped off. Washing makes a shell more porous, making the eggs liable to lose too much moisture both while being stored and during incubation in the machine. Eggs which lose too much moisture hatch out undersized chicks.

B. Eggs Which Should Not Be Placed in an Incubator.

Most poultrymen are aware that double-yolked, misshapen, ridged, and rough-shelled eggs should not be used for incubation, but there are one or two other types of eggs to which less attention is paid. The internal quality and shell texture are two characteristics which must be considered. It may be noted that the authorities responsible for laying contest regulations had this in mind when they allocated a proportion of the scoring points for the external (condition of shell) and internal qualities of the eggs produced by the birds in these contests. It will be interesting at this stage to trace what effect shell texture and internal quality have upon hatching results.

(1) Porous-shelled Eggs.

It is well known that this type of egg gives poor results. Rapid evaporation occurs, resulting in an undersized chick or no chick at all. Shells of this type can usually be noted by their rough surface and metallic ring if tapped with a finger-nail. The soundest method of detection, when in doubt, is to place the egg in front of a candling lamp, when the mottled appearance of the shell is easy to observe.

This type of shell is also liable to what are usually termed "hair cracks." Ordinary cracks are easy to see or easily detected by gently tapping two eggs together. Hair cracks are often more difficult to detect, and here again the safe method is the use of the candling lamp. It might be thought that such small shell cracks are of small importance from a hatching point of view, but the figures quoted below and taken from experiments conducted in England reveal the true position with regard to these hair cracks.

	Normal Eggs.	Hair Cracks.
Set	25,799	289
Infertile ..	11%	21%
Dead Germs ..	6%	11%
Dead in Shell	12%	18%
Hatch of All Eggs Set ..	70%	49%

(2) Internal Quality of Hatching Eggs.

Internal quality is more difficult to observe, but with the use of a candling lamp two types of faulty eggs can be detected, namely, "watery whites" and "blood spots." Both these types of faulty eggs give poor hatching results, as can be seen by noting the figures given below. These figures were obtained in the same experiment in England quoted for "hair cracks":—

	Normal Eggs.	Blood Spots.	Watery Whites.
Set	25,799	170	63
Infertile ..	11%	22%	44%
Dead Germs ..	6%	9%	11%
Dead in Shell	12%	15%	16%
Hatch of All Eggs Set ..	70%	53%	27%

Further comment upon these figures is unnecessary. Porous shells and eggs with watery whites or blood spots should be avoided whenever possible. Fortunately, the last two named are present in very small numbers among eggs produced on a well-managed farm with good stock.

In the experiment referred to above all the chicks which were obtained from faulty eggs were toe-punched and the deaths and culls killed during the first month of rearing were recorded. The results were of considerable interest:—

Chicks from—

Normal eggs	5.9% loss
Blood spots	7.6% loss
Hair cracks	10.5% loss
Watery whites	22.8% loss

C. Incubation Routine.

Incubators in use today may be divided roughly for type into two groups—the table-top and cabinet machines. The incubation practices to be discussed will be largely limited to management applicable to both types, unless otherwise stated.

(1) Placing Eggs in an Incubator

Once in a while broken yolks, as detected with the candling lamp at testing time, become troublesome. This is caused by eggs heating up too rapidly when first put into an incubator. The sudden heating-up causes the yolk to expand too rapidly and to burst the delicate membrane which surrounds this yolk material. Speaking generally, this occurs only when eggs are very cold when placed in the incubator, so that when eggs are thought to be unusually cold they should be pre-heated by being placed in a warm room for some hours before being placed in the incubator. A practical method of testing the temperature of an egg is to place it against one's closed eyelid. An eyelid is very sensitive to temperature, and is therefore a useful guide.