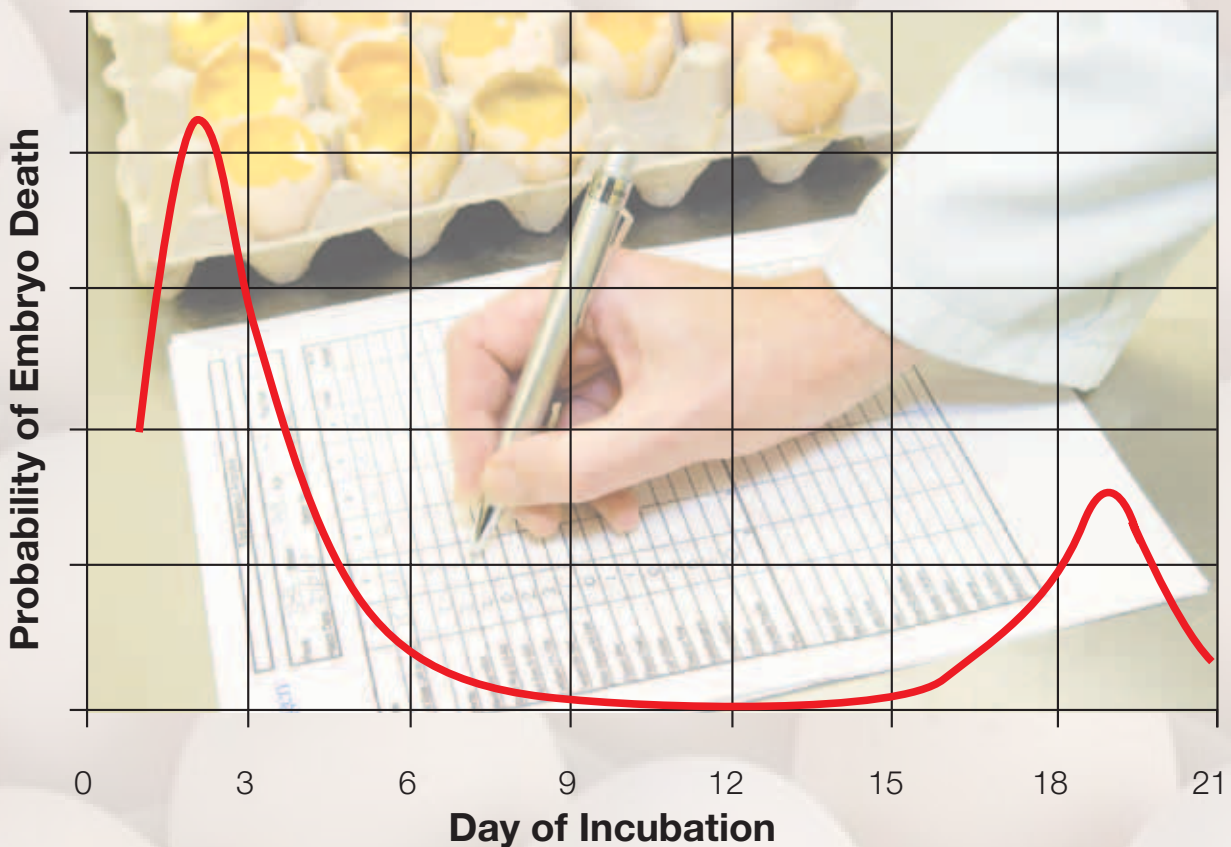


WHY BREAK OUT AND ANALYSE HATCH DEBRIS?

- It is normal for there to be some embryo mortality during incubation.
- Embryo losses tend to follow a consistent pattern (although it will vary slightly with flock age).
- Some embryo malpositions and abnormalities have known causes and can be the result of specific problems.
- Analysing embryo mortality patterns and abnormalities can help to identify which aspects of the incubation process need closer investigation in order to improve hatchability and chick quality.

Normal Pattern of Embryo Loss During incubation showing peaks in mortality during early and late incubation



THE PROCEDURE FOR BREAKING OUT HATCH DEBRIS

Step 1:

Sample selection and preparation.

- Hatch debris breakouts should be integrated with other QA procedures such as measuring egg water loss and chick yield.
- Monitor three setter trays per flock per week, and label sample trays clearly at the time of set.
- The eggs used for the sample trays should be clean nest eggs of known flock source, flock age and egg age.

Note: Clear or non-viable eggs should not be removed from trays. However, it will not be possible to distinguish infertile from early embryo mortality on clear eggs left in the setter for 18 days. A separate sample of eggs should be used for fertility identification (see **How To... Identify Infertile Eggs and Early Deaths**).

Step 2:

Take off and count dead in shell.

- On the day of hatch, count chicks and culls out of the sample setter trays. Record their numbers per tray.
- Collect, count and separate out the unhatched (dead in shell) eggs. Record their numbers per tray.



Note: The totals for chicks plus culls and dead-in-shell should equal the number of eggs set, less any removed at candling.

Step 3:

Breaking out dead in shells.

- Identify and count any eggs where the beak has pierced the shell (pips). Record numbers, and note if any chicks are still alive.
- Open all the eggs, at the air cell. Take care not to remove any egg contents when lifting the air cell membrane.
- Identify the stage of development of the embryo and sort eggs into groups of infertile, early dead (0-7 days) mid dead (8-15 days) and late dead (15-21 days) using the pictures on page 3.
- Check very late (20-21 days) dead embryos for malpositions.
- Check for malformations in the mid and late dead embryos.
- Also record any with cracked or poor quality shells and any eggs that are contaminated.



At the start of the recording period, the embryo will look like this:

By the end, the embryo will have grown to look like this:

After death, the appearance changes and the dead in shell embryos may look like this:

Infertile

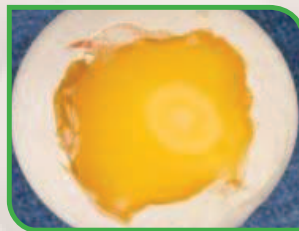
No obvious signs of development.



Early Dead

1-7 days

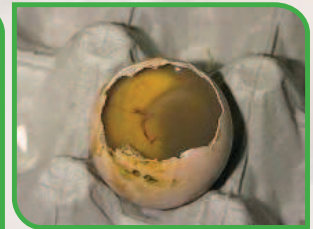
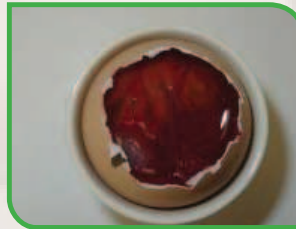
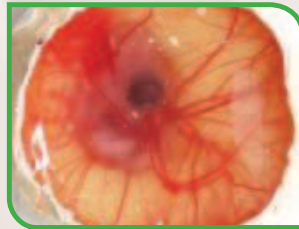
The end of this stage is marked by the appearance of the egg tooth on the beak.



Mid Dead

8-14 days

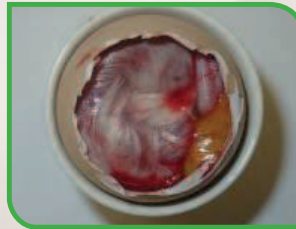
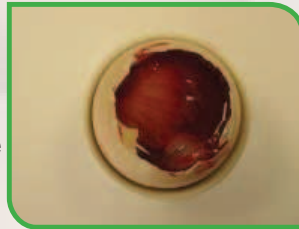
Embryos have an egg tooth but no obvious feather development.



Late Dead

15-19 days

Well feathered embryo, fills the shell. Yolk may be external or retracted.



External pip

20 days

The beak has broken through the egg shell.



Contaminated

Deep discolouration of the egg contents, which smell off.



COMMON MALPOSITIONS



Normal Hatching Position



Malpo 2: Head in small end of egg



Malpo 3: Head turned to left



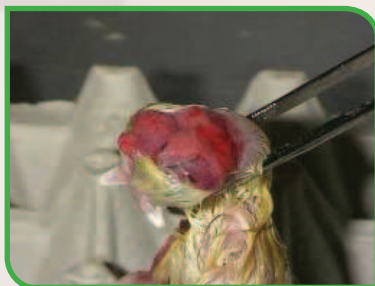
Malpo 5: Feet over head



Malpo 6: Beak above right wing

Note: Malpositions normally occur in 1.5% of all eggs set. The incidence of Malposition 3 (Head turned to left) and Malposition 5 (Feet over head) is normally 0.25% of eggs set (each). The incidence of Malposition 6 (Beak above right wing) is normally about 0.4% of eggs set. Head in small end of shell (Malposition 2) is the most variable malposition as it caused by setting eggs upside down. The occurrence of this malposition should not exceed 0.1% of eggs set.

COMMON MALFORMATIONS



Exposed brain



Ectopic viscera



Duplication of body parts

Note: Occasional abnormalities are not a cause for concern. Further investigation is appropriate only if a single malformation occurs at levels over 0.5% of the eggs set.

THE PROCEDURE FOR ANALYSING HATCH DEBRIS

- Record the number of eggs falling into each category for each tray.
- Add these numbers together to determine the total number of eggs falling within each category.
- Calculate the total as a percentage of the number of eggs set.

Example recording sheet for hatch debris break out information

	Date Set	<u>3rd March</u>
Farm	<u>B20</u>	Date Hatched <u>14th March</u>
Age	<u>31 weeks</u>	Date Broken Out <u>24th March</u>
Hatch Tray Size	<u>150</u>	Setter No. <u>12</u>
	Hatcher No.	<u>3</u>

Tray No.	1	2	3	4	5	6	7	8	9	10	Total	% of Eggs Set
No. of Eggs Removed	19	18	15								52	11.6
Infertile	6	4	4								14	3.1
"Early Dead" (0-7 Days)	5	5	5								15	3.3
"Mid Dead" (8-14 Days)	2	1	1								4	0.9
"Late Dead" (15-21 Days)	5	5	4								14	3.1
External Pip	1	3	1								5	1.1
Dead and Cull Chicks	1	0	2								3	0.7
Contaminated	1	3	1								5	1.1
Poor Sheel Quality	0	0	1								1	0.2
Cracked Shell	0	0	1								1	0.2
Malpositions - Head in Small End of Egg	1	-	-								1	0.2
- Head to Left	-	-	-								-	-
- Feet Over Head	-	2	1								3	0.7
- Beak Above Right Wing	-	-	-								-	-
Malformations - Exposed Brain/Eye Defect	-	-	-								-	-
- Extra Limbs	-	-	-								-	-
- Ectopic Viscera	-	-	-								-	-

Notes:

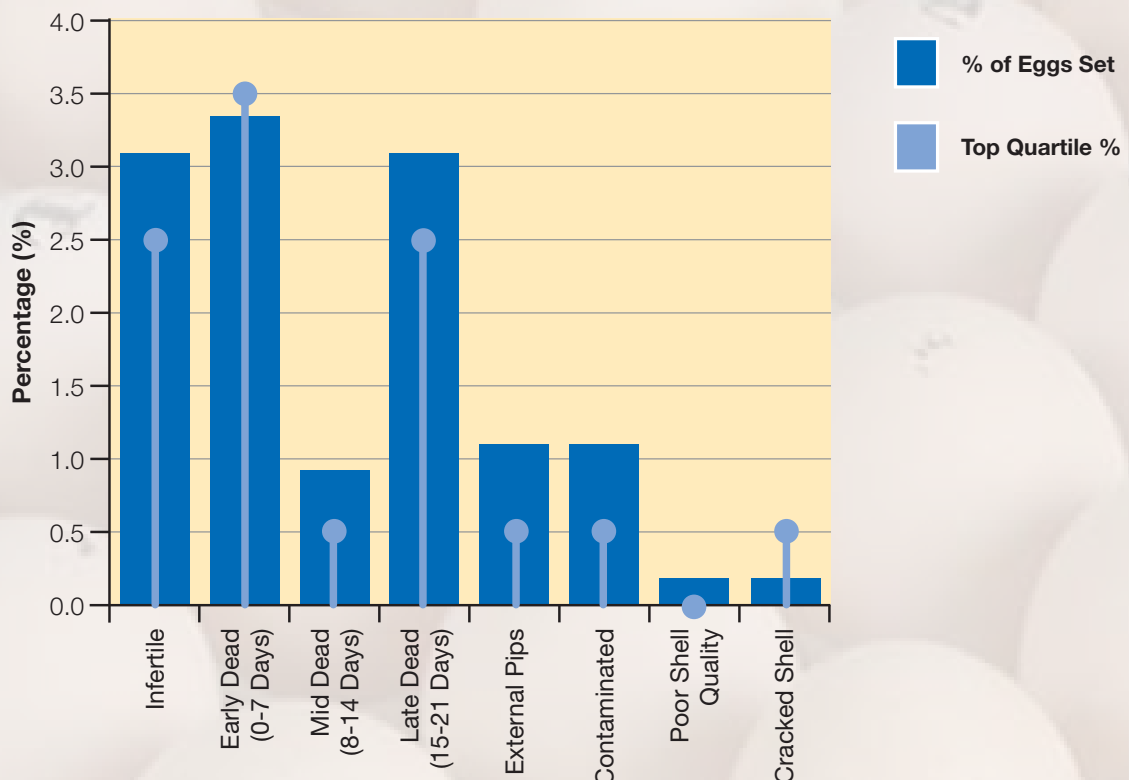
INTERPRETING RESULTS

- Compare the results with the targets for the age of the flock concerned

Flock Age	Stage of Development of Embryo						
	Infertile	Early Dead	Mid Dead	Late Dead	External Pip	Cracked	Contaminated
Young 25-30 Weeks	6	5.5	1	3.5	1	0.5	0.5
Peak 31-45 Weeks	2.5	3.5	0.5	2.5	0.5	0.5	0.5
Post Peak 46-50 Weeks	5	4	1	2.5	0.5	0.5	0.5
Ageing 51-60 Weeks	8	4.5	1	3	0.5	1	1

- Plot results against target. If any figure is above target an investigation into the reason for this should be set up

Simple Hatch Debris Analysis



Notes: Any assessment of infertility made at the end of incubation during a breakout is likely to be inaccurate as it is not possible to distinguish true infertile from early deads. If the early dead plus fertility numbers exceeds the target then follow the procedures in the **How To... Identify Infertile Eggs and Early Dead**s before taking further action.

POSSIBLE CAUSES OF EMBRYO MORTALITY

	Hatchery	Farm
Early Dead (1-7 Days)	<ul style="list-style-type: none"> Formalin exposure 12-96 hours. Slow to reach incubation temperatures Condensation on egg surface Turning angle/frequency not correct Long egg storage Fluctuating egg storage temperature 	<ul style="list-style-type: none"> Inadequate egg collection Nutrition Egg contamination Floor/soiled eggs
Mid Dead (8-14 Days)	<ul style="list-style-type: none"> Embryo temperature too high 	<ul style="list-style-type: none"> Nutritional deficiencies Contamination
Late Dead (15-19 Days)	<ul style="list-style-type: none"> Setter/hatcher temperatures/humidities incorrect – check egg shell temps and water loss. Transfer damage Eggs set upside down Insufficient water Loss 	<ul style="list-style-type: none"> Nutritional deficiencies Contamination
At pipping	<ul style="list-style-type: none"> Inadequate turning/eggs set upside down Transfer damage Excessive fumigation in hatcher Long egg storage 	<ul style="list-style-type: none"> Nutritional deficiencies
Contamination	<ul style="list-style-type: none"> Egg shell disinfection inappropriate Condensation on egg surface during storage or transport Thin or cracked shells High level of contamination in the hatchery (if late deads only) 	<ul style="list-style-type: none"> High levels of floor eggs Poor nest hygiene
Malpositions	<ul style="list-style-type: none"> Head in small end – egg incubated upside down, high incubation temperature or shallow turning angle Beak above right wing - heat stress Other malpositions - causes unknown 	<ul style="list-style-type: none"> Beak above right wing - Nutritional deficiencies (linoleic acid)
Malformations	<ul style="list-style-type: none"> Exposed brain - high early incubation temperatures Ectopic visera - high incubation temperatures mid-term Extra limbs - rough handling or jarring of the eggs during collection/transport 	