Hatch Breakout Analysis

Aviagen Turkeys Ltd ®

Definition

A hatch breakout analysis involves opening unhatched eggs (Dead-in-Shell) to determine at what stage of incubation embryo mortality has occurred. A hatch breakout is a useful tool for solving hatch problems and looking for areas to improve hatch performance.

Objectives

To quantify the number of embryos dying at different stages of development, look for any indications of abnormal development and other potential causes of hatch loss (e.g. cracks and microbiological contamination).

Procedure

1. For breakout analysis, identify 5 sample setter / hatcher trays per breeder flock and hatch. Choose the trays from different positions within the incubator. For the sample trays:

- Record the number of eggs per tray.
- At fertility testing open all eggs removed from the sample trays as clear or early dead germ. Do not refill the trays after fertility testing.
- At hatch take-off, count the number of culls and cracked eggs on each sample tray and open all unhatched eggs.
- Record results on record sheet; express mortality as percent of eggs incubated.
- Record whether the hatch debris was clean or dirty, the poults were still hatching (wet poults still on tray) or if poults were very thin as this provides clues as to advanced or late hatch.

2. A suggested staging for embryos:

- Infertile – no sign of embryo development, clear albumen and yellow yolk with white dot (Figure1).
- Died 1 – 2 days – presence of white disc > 1cm on yolk, albumen may be cloudy, no evidence of blood vessels. (Figure 2).
- Died 3 – 9 days – first sign of blood vessels on yolk (Figure 3) up to embryo with limbs and beak visible but no egg tooth present (white dot on end of beak).
- Died 10 – 15 days – egg tooth visible (Figure 4) until first feathers present.
- Died 16 – 24 days – feathers first present (Figure 5) until the embryo starts to withdraw yolk sac and moves into hatching position (head under right wing) (Figure 6).
- Died 25 – 27 days – yolk sac retraction started and in hatching position up to the start of pipping (Figure 7).
- Pipped dead – shell pipped but embryo died.
- Pipped alive – shell pipped and embryo still alive. Note if the membranes and feathers are dry (Figure 8) or wet. This indicates whether the embryo has been pipped for a long time but has been unable to emerge from the shell or is a late hatching embryo.

Figure 1 – infertile

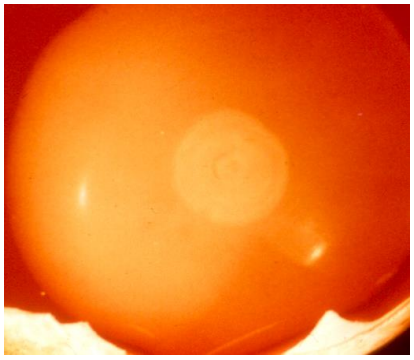


Figure 2 – day 1

Figure 3 - day 3

Figure 4 – day 10

Figure 5 – day 15

Figure 6 – day 25

Figure 7 – pipped

Figure 8 – dry pip

3. Record any malpositioned embryos:

- Type I – head between legs (normal position before day 25).
- Type II – head in small end of egg.
- Type III – head under left wing.
- Type IV – head pointing away from aircell (rare).
- Type V – leg overhead.
- Type VI – head on top of right wing.

4. Record any abnormalities:

- Beak deformities – short upper or lower, parrot beak, crossed beak or notch in upper beak.
- Body abnormalities – multiple limbs, deformed head, short legs (Figure 9), open body or cranial cavity.
- Abnormal feathers (Figures 10 and 11).
- Dwarfed – small embryo for stage of development.
- Eye abnormalities – missing eye(s), eye cataracts (Figure 12).
- Leg or head trapped by yolk sac.

- Swollen head or body – odema (Figure 13).

Figure 9 – short legs

Figure10– type of abnormal down

Figure11– type of abnormal down

Figure 12 – eye cataract

Figure 13 – head odema

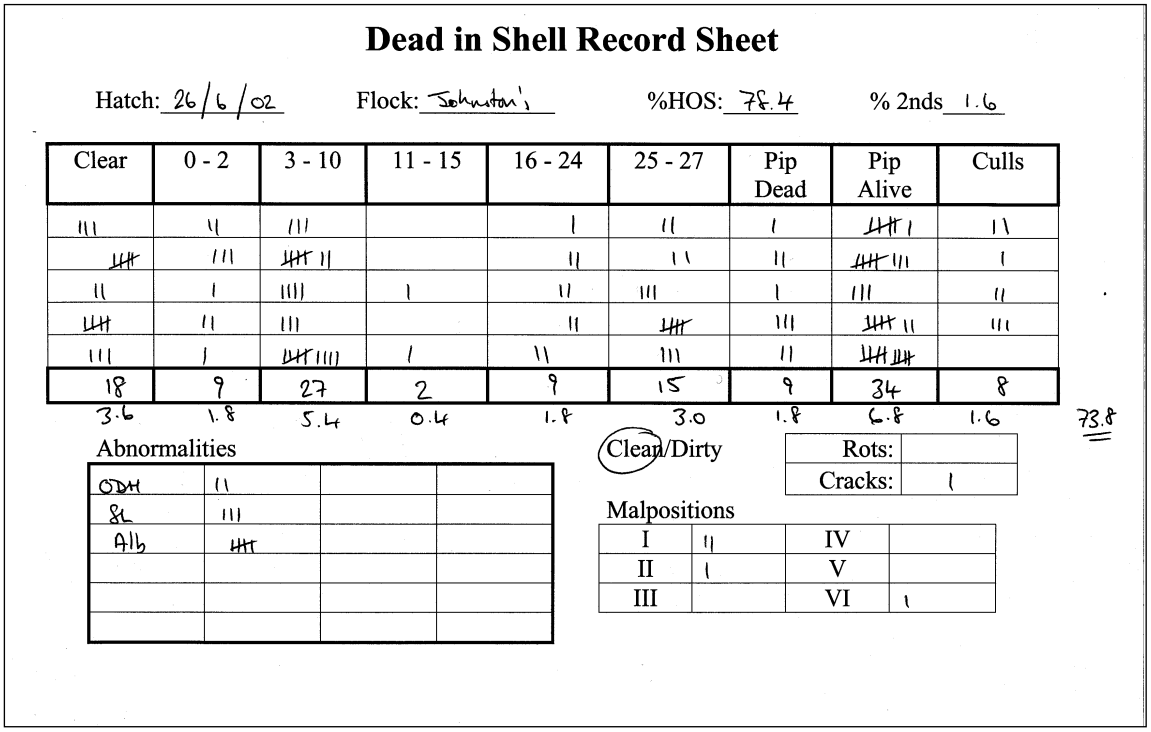
5. Record any contamination:

- Mould growth.
- Smelly or exploding eggs.
- Where egg contents have curdled.
- The presence of black liquid around the embryo is not a sign of microbial contamination – this is caused by the normal breakdown of tissues following death.

6. Record any cracked eggs:

- The location of the crack may be an indication of the cause of the damage.
- The degree to which the egg contents have dried will indicate how early the crack occurred during incubation.

An example of a complete Dead in Shell Record Form is shown in Figure 14, each line represents one hatcher tray.



Dead in Shell Record Sheet

Hatch: 26/6/02 Flock: Johnston's %HOS: 78.4 % 2nds 1.6

Clear	0 - 2	3 - 10	11 - 15	16 - 24	25 - 27	Pip Dead	Pip Alive	Culls
111	11	111		1	11	1	5HH 1	11
5HH	111	5HH 11		11	11	11	5HH 111	1
11	1	1111	1	11	111	1	111	11
5HH	11	111		11	5HH	111	5HH 11	111
111	1	5HH 1111	1	11	111	11	5HH 5HH	
18	9	27	2	9	15	9	34	8
3.6	1.8	5.4	0.4	1.8	3.0	1.8	6.8	1.6

73.8

Abnormalities

ODH	11		
&L	111		
Alb	5HH		

Clean/Dirty

Rots:	
Cracks:	1

Malpositions

I	11	IV	
II	1	V	
III		VI	1

Figure 14 - Dead in Shell Record Form

Interpretation of Results

- Results from a hatch breakout should be combined with other information to provide a total picture. This information should include hatchability records, breeder performance records, incubation records and hatch timing information.
  - Infertility.
  - Delayed hatch with lots of live pips, clean hatch debris, and wet, fat poults, as illustrated by Figure 14 above.
  - Contamination problem.
  - Egg handling problem – lots of cracks and malpositions.
  - Long egg storage (>7 days) normally increases the incidence of early dead germs and pipped eggs. It will also delay the hatch.
- In a good hatching flock there are two main periods of embryo mortality: 3 – 10 days and 25 – 27 days + pips. High mortality at other development stages is not normal.
- A high incidence of mortality at a particular stage of development can indicate an acute problem during incubation caused by a machine failure.
- A chronic problem, such as slight overheating, may result in mortality later in incubation.
- Specific embryo abnormalities can be associated with specific problems (nutritional, incubation, toxins and disease) but it is important to note that the same abnormality can be the result of more than one problem. For example eye cataracts have been associated with high incubation temperature, mycotoxins and vitamin E deficiency.
- Experience of hatch breakouts with good hatching flocks is important for understanding what is normal and abnormal.

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