WHY MEASURE FERTILITY AND EARLY DEADS LEVELS?

- An unfertilised egg cannot produce a chick.
- Flock fertility is governed by management of males and females on the breeder farm and **cannot** be affected by egg handling, egg storage or incubation conditions.
- Early embryo mortality **can** be affected by egg handling, egg storage or incubation conditions.
- The action required to correct poor fertility is not the same as that required to correct excess early dead, therefore it is important to distinguish between infertility and early deads.

An individual egg being candled.

PROCEDURE FOR ASSESSING FLOCK FERTILITY

- What is an infertile egg?
  - An infertile egg is one that has not been fertilised
- What is an early dead embryo?
  - An early dead is an egg which has been fertilised but in which the developing embryo dies in the first week of incubation
  - After an embryo dies it will deteriorate over time, therefore the longer eggs are incubated the more difficult it becomes to distinguish early deads from infertiles
- During candling eggs with a developed embryo will appear dark.
- Clears are not always infertile
- A clear egg may be infertile or contain an early dead embryo.
- Therefore, to accurately identify infertility and early deads a breakout of candled clears needs to be completed.

Dark eggs contain a live embryo.

- There are 2 methods for assessing flock fertility:
  1. in un-incubated eggs
  2. in clear eggs candled between 10 and 14 days of age

	Advantages	Disadvantages
Un-incubated eggs	Quick feedback Can be done on farm Can see mottling and egg quality issues	Destroys potential hatching eggs Small sample size (so the sample result can be very different from the flock average) Takes practice
Clears 10-14 days	Does not destroy potential hatching eggs Bigger sample size (so better precision) Easy to learn	No results until approx. 17 days after lay Not necessarily standard practice to candle at 10-14 days Internal egg quality issues difficult to see

PROCEDURE FOR ASSESSING FLOCK FERTILITY

METHOD 1 - IDENTIFYING INFERTILITY IN UN-INCUBATED EGGS

- Eggs are fertilised high in the reproductive tract and embryonic development continues until the egg is laid.
- This makes it possible to identify infertile eggs before incubation.

Step 1:
Take a sample of 100 fresh normal hatching eggs per house, of known egg age.

Step 2:
Break eggs, one at a time, over a bucket allowing the albumen to drop into the bucket and catching the yolk in your hand. Roll the yolk over until the germinal disc can be seen.

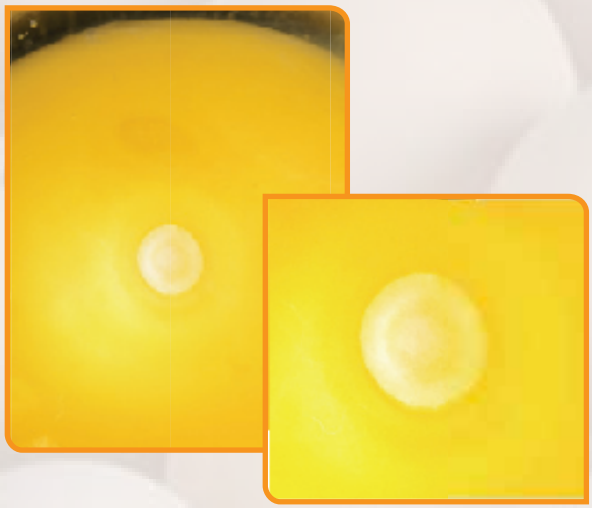
Note: *The task is easier in good natural light. If this is not available, a single-led (light emitting diode) torch will illuminate the disc without causing reflection off the yolk surface. A magnifying glass can also be helpful.*

INFERTILE BLASTODISC

- Dense, white spot, 2-3 mm (0.1 in) diameter
- Rarely perfectly round, jagged edges
- Bubbles

FERTILE BLASTODERM

- White, symmetrical ring 4-5 mm (0.2 in) diameter, with a clear central area
- Round, with smooth uniform edges
- No bubbles



Example of egg fertility recording sheet.
Record incidence of fertile and infertile eggs and compare to targets (see page 8).

Company ACME Farming

Date 31st January 2010

Farm	W/H 26W	S/V 36W	U/H 46W	R/R 56W				
No. of Eggs Sampled	100	100	100	100				
Fertile	81	95	81	87				
Infertile	19	5	19	13				
- Motted Yolk	1	2	20	30				
- Watery Albumen	-	-	-	-				
- Sticky Yolk	-	-	-	-				

Take the chance to observe and record any yolk mottling. If severe, this can increase very early dead embryos.

PROCEDURE FOR ASSESSING FLOCK FERTILITY

METHOD 2 - IDENTIFYING INFERTILE EGGS AND EARLY DEAD EMBRYOS IN CLEAR EGGS CANDLED BETWEEN 10 AND 14 DAYS OF INCUBATION

- Fertility can also be assessed in eggs candled clear between 10 and 14 days of incubation.
- It is not advisable to try and assess fertility on eggs candled any later than this because post mortem degeneration of the embryo makes it difficult to distinguish infertile eggs from those with very early embryonic development.

Step 1:
Candle three setter trays per flock, between 10 and 14 days incubation.

Step 2:
Remove and hold the clears, keeping them separate to flock and setter tray.

Step 3:
Open the eggs with forceps at the air cell, taking care when removing the membrane that no egg contents are discarded.

Step 4:
Identify fertility or stage of development at death, using the photos on reverse page.

Degeneration after death will change the appearance of the early dead embryos and this is also shown in the photos.

	Normal appearance of live embryo	Appearance after 8-10 days incubation	Appearance after 14-15 days incubation
Infertile			
Death After 24 Hours Development			
Death After 48 Hours Development			
Death at Blood Ring Stage* (2.5-4 days)			
Death at Black Eye Stage (5-12 days)**			

Note:

* *With blood ring stage deaths, once the blood vessels degenerate, often the only sign of embryo development is a change in colour to a creamy yellow. This does not indicate contamination.*

** *Embryo death at the black eye stage is often associated with bacterial rots – in addition to discolouration, the egg contents smell bad and have often disintegrated.*

Example of candling analysis recording sheet.

Record incidence of fertile and infertile eggs and compare to targets (see page 8).

Transfer Candling Analysis

Company	ACME Farming	Date Set	31st Jan 2010
Farm	Underhill	Date Candled	11th Feb 2010
Age	46 weeks	Date Broken Out	11th Feb 2010
Setter Tray Size	150	Setter No.	4

Tray No.	1	2	3	4	5	6	7	8	9	10	Total	% of Eggs Set
No. of Eggs Removed	36	34	30								100	22.2
Infertile	27	22	21								70	15.6
24h Early Dead	1	2	2								5	1.1
48h early Dead	2	2	2								6	1.3
"Blood Ring" (2.5-4 days)	5	6	7								17	3.8
"Black Eye" (5-12 days)	1	2	1								4	0.9

Notes:

INTERPRETING RESULTS

- The table below gives top quartile targets for hatchability losses when performing detailed diagnostic/research type egg breakouts (% of total number of eggs set).

Flock Age	Stage of Development of Embryo					
	Infertile	24 hours	48 hours	Blood Ring	Black Eye	Feathers
Young 25-30 weeks	6	1	2	2.5	1	1
Peak 31-45 weeks	2.5	0.5	1	2.0	0.5	0.5
Post Peak 46-50 weeks	5	0.5	1	2.5	1	0.5
Ageing 51-60 weeks	8	0.5	1	3.0	1	0.5

- If the target for a category is exceeded the cause of this should be investigated.

	Hatchery	Farm
Causes of High Infertility		Young/old Males Males heavy or losing condition Females under/over weight or losing condition Nutrition Drugs/toxins in feed Disease Legs/feet in poor condition
Causes of Early Embryo Mortality (1-4 days)	Long egg storage (> 7 days) Egg store temperature too hot, too cold or fluctuating Formalin exposure 12-96 hours of incubation Slow to reach incubation temperature	Yolk mottling due to stress (over mating, stocking density) or nicarbazine Egg collection not often enough (should be >3 times/day) Nutrition
Causes of Embryo Mortality 5-7 days	Long egg storage (> 7 days) Egg store temperature too hot, too cold or fluctuating Formalin exposure 12-96 hours of incubation Slow to reach incubation temperature Eggs contaminated during storage Condensation on the egg surface Turning angle too shallow, frequency too much or too little	Yolk mottling due to stress (over mating, stocking density) or nicarbazine Egg collection not often enough (should be >3 times/day) Nutrition Floor or soiled eggs