



Hatchery Talks

Hatching egg quality

Before we start ...

- **Polls**
- **Questions in chat**
- **Webinar-replay + hand-out**



Contents

- **Breeder farm**
- **Internal quality**
- **External quality**
- **Egg handling**



Hatching egg quality

Poll

By how much, in percentage, do you think that hatching results (hatchability) are influenced by the egg quality at the start of incubation?



Hatching egg quality

Poll

“Hatch results (hatchability and chick quality) depends on hatching egg quality at the start of incubation”



Hatching egg quality

Good quality hatching egg



External aspects	Internal aspects	Other aspects
Shell: intact, smooth and clean	Fertile	Nutrition breeder → embryo (positive and negative)
Size: uniform weight, not too big or too small	Embryo at optimum stage of development	Free of diseases (Salmonella spp, Mycoplasma spp, etc.)
Shape: oval, sharp end downwards	"Fresh" and properly stored (yolk, albumen, embryo)	Maternal antibodies
	Meat and blood spots	Heredity (sexing errors)

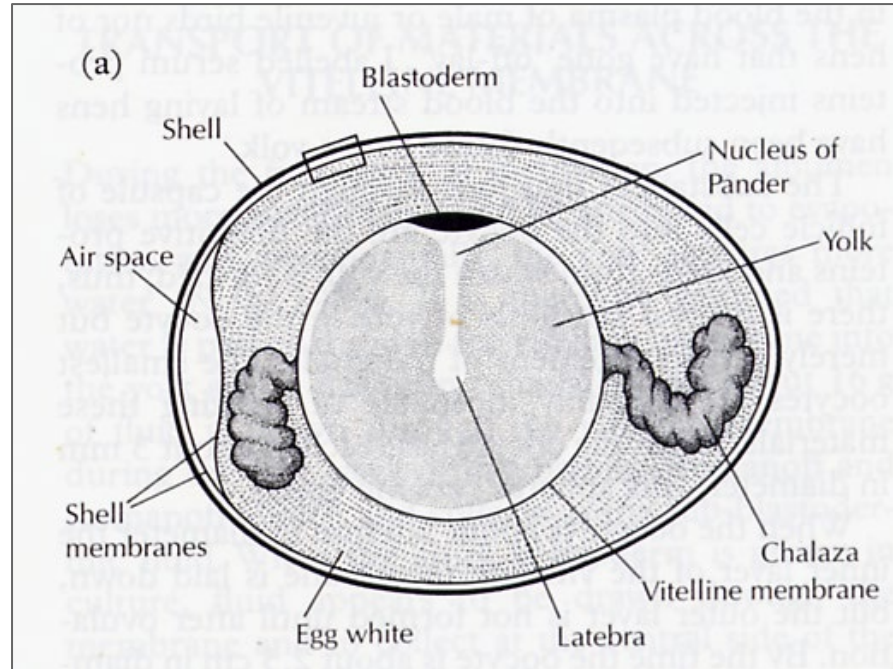
Hatchery Talks

Breeder farm



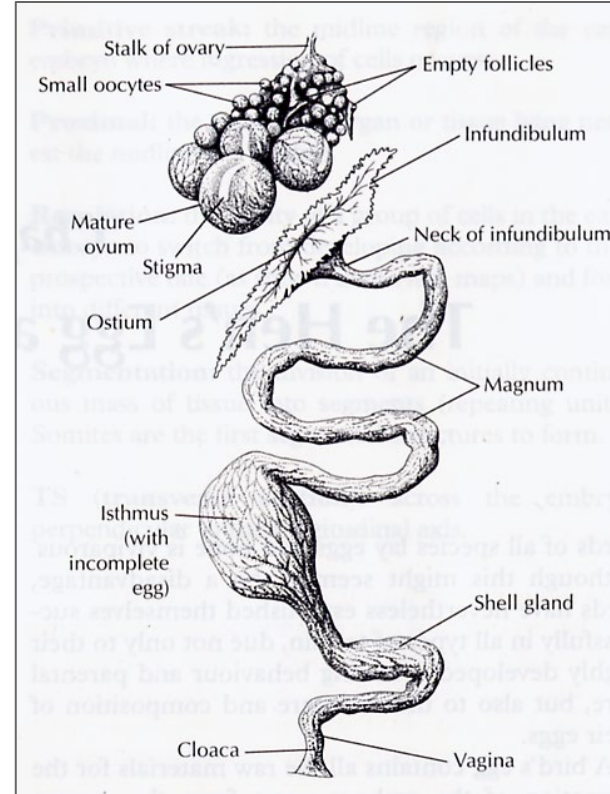
The Hatching egg

- **60% yolk**
- **30% albumen**
- **10% shell**



Maternal origin of basic nutrients

- Yolk (ovary)
- Albumen proteins (magnum)
- Shell membranes + water (isthmus)
- Shell (shell gland)



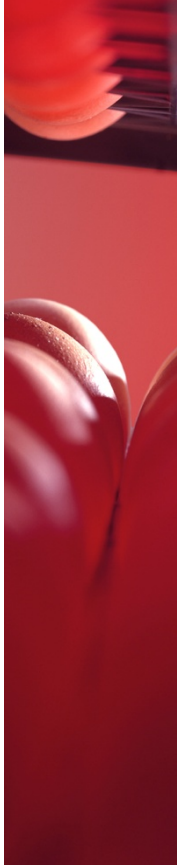
Egg formation



Oviduct	Event	Time spent
Ovary	Ovulation	0 h
Infundibulum	Fertilization + addition of thick albumen	15 min
Magnum	Albumen (thin) added	3 h
Isthmus	Shell membranes added	1.5 h
Shell gland	Shell added	20 ± 2 h

Egg quality depends on:

- Breeder farm management
- Flock age
- Nutrition
- Health status
- Egg handling
- Egg storage



Breeder Farm

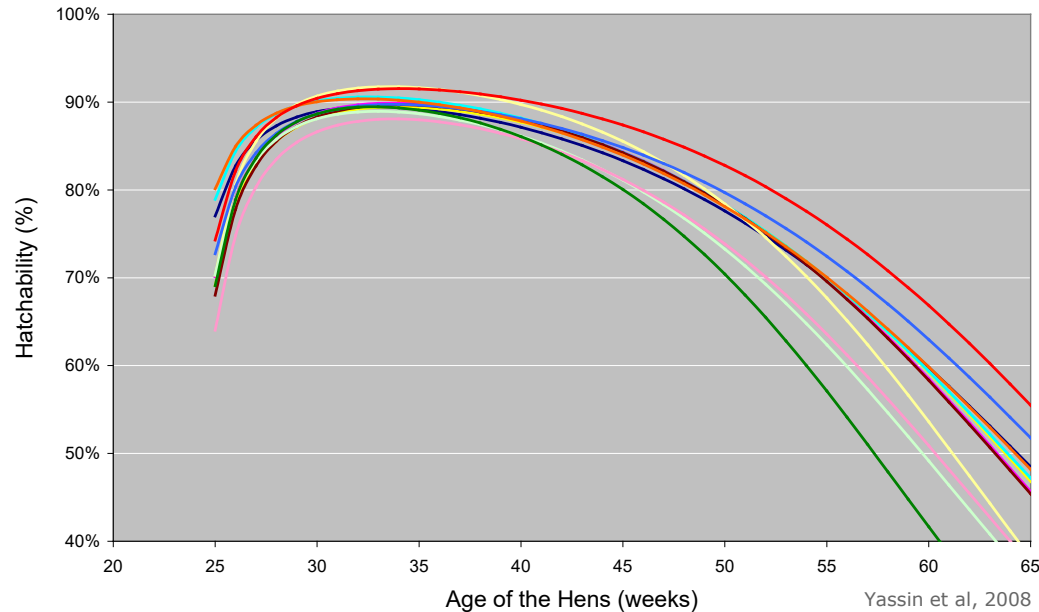
Fertility



Breeder Farm

Feed

Difference in hatchability curves between different feed companies



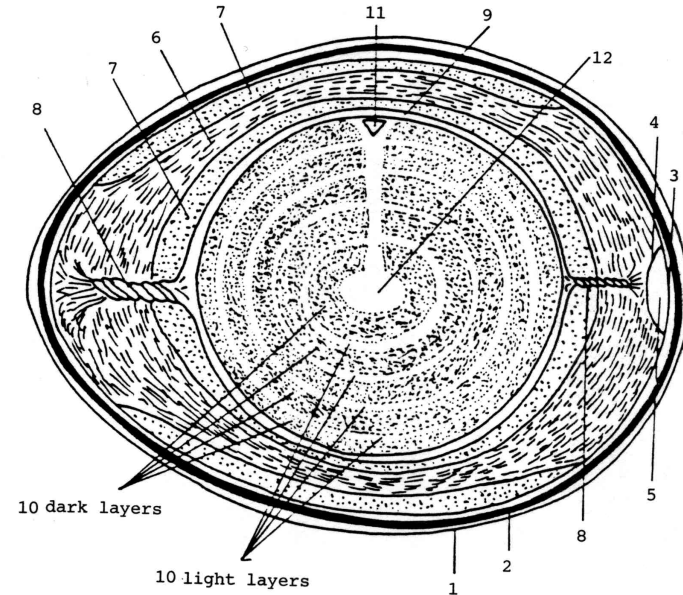
Breeder Farm

Nest quality



Defence mechanisms

- **Cuticle**
- **Shell with pores**
(hair line cracks)
- **Outer and inner shell membrane** (delay, not prevent)
- **Thick albumen**
(lysozyme and alkaline environment)



Breeder Farm

Egg collection



Cooling down of eggs

- **Development stops at room temperature (20-22 °C)**
- **This cease of development means that the embryo entered a period of diapause.**
- **Development continues when the temperature increases**

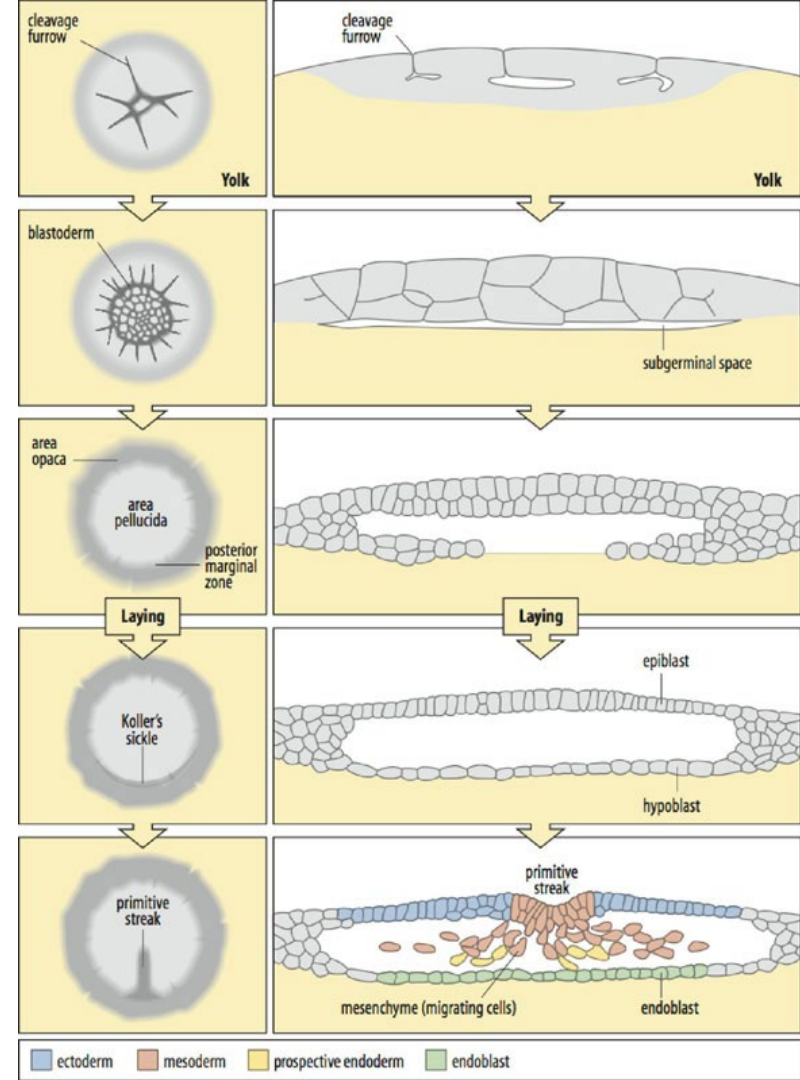


Breeder Farm

Embryonic stage

Embryonic stage at oviposition

Embryonic stage after cooling to room temperature



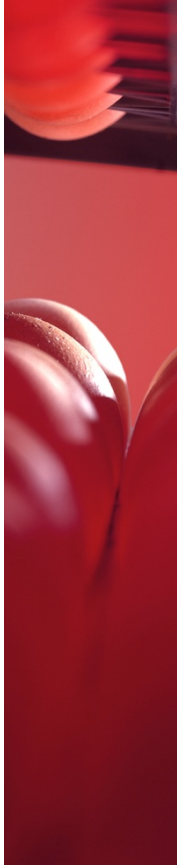
Storage conditions at breeder farm

- Cooling down in 6 hours to $< 25^{\circ}\text{C}$
- In storage room $18 - 21^{\circ}\text{C}$; relative humidity (60) – max. 85 %



Transport of eggs

- **Avoid “sweating”**
During loading and transport, temperature in the truck equal or lower than farm store + low RH%
- **Road**





Hatchery Talks

Internal quality

Internal quality

Quality is subjective, different opinions

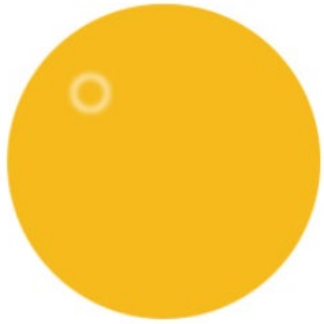
Some factors can be scored objectively:

- Embryo: diameter
- Air cell: depth
- Albumen: Haugh units (height)
- Yolk: color



Internal quality

The unincubated fertile and infertile egg



Fertile



Fertile



Fertile, too
far developed



Infertile



Internal quality

Air cell



Fresh egg with a small air cell



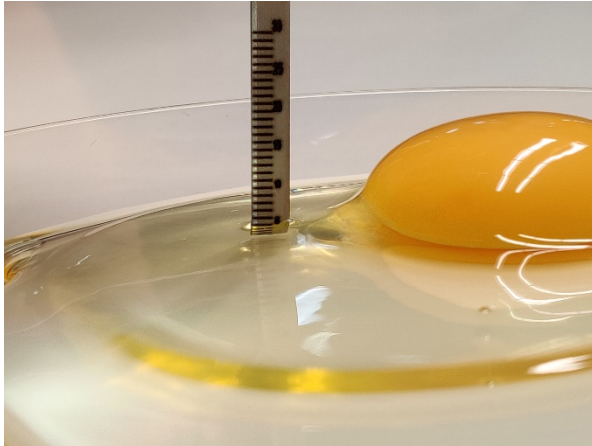
Long stored egg with a big air cell



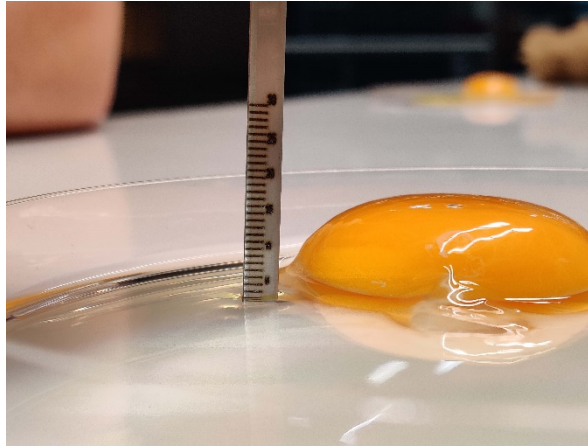
Internal quality

Haugh unit

The haugh unit is calculated based on egg weight and albumen height



Thick and firm albumen of a fresh egg



Weak & watery albumen of a long-stored egg



Internal quality

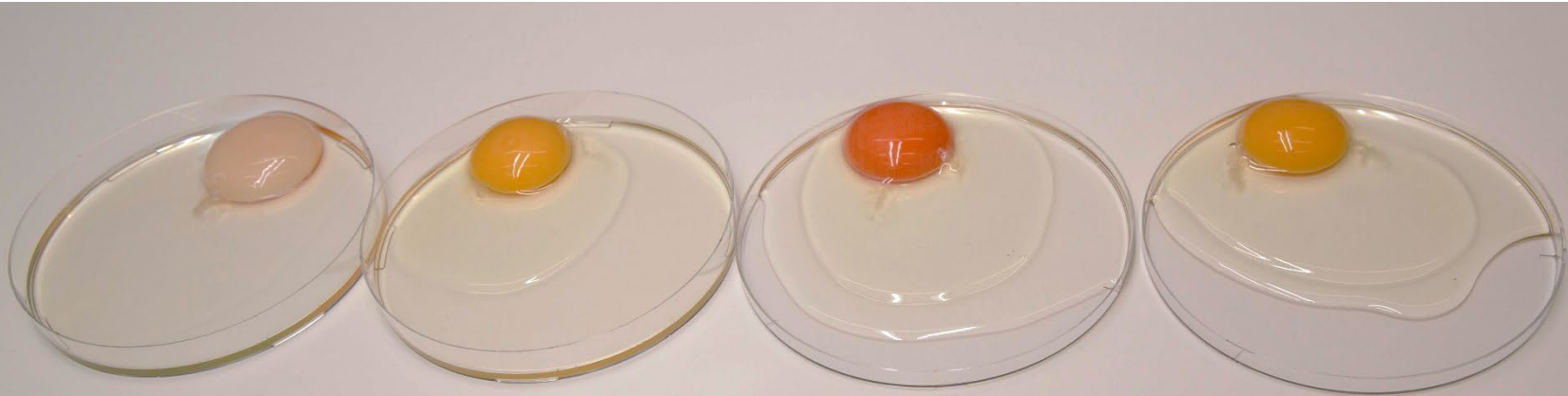
Poll

Yes or no. The color of the egg yolk says something about the quality?



Internal quality

Yolk color



Recording forms



Recording Form 8B: Internal hatching egg quality upon receipt

Egg ID-code		Breed	
Production date		Maternal age	
Date of receipt		Date of quality control	

Category	Number of eggs within ...	
	Sample of 10 eggs	Additional 20 eggs
Air cell depth > 2 mm		
Albumen thin and watery		
Yolk <ul style="list-style-type: none">- Flabby and flat- Very pale colour- Mottled		
Blood- or meat spots		
Total		



Hatchery Talks

External quality

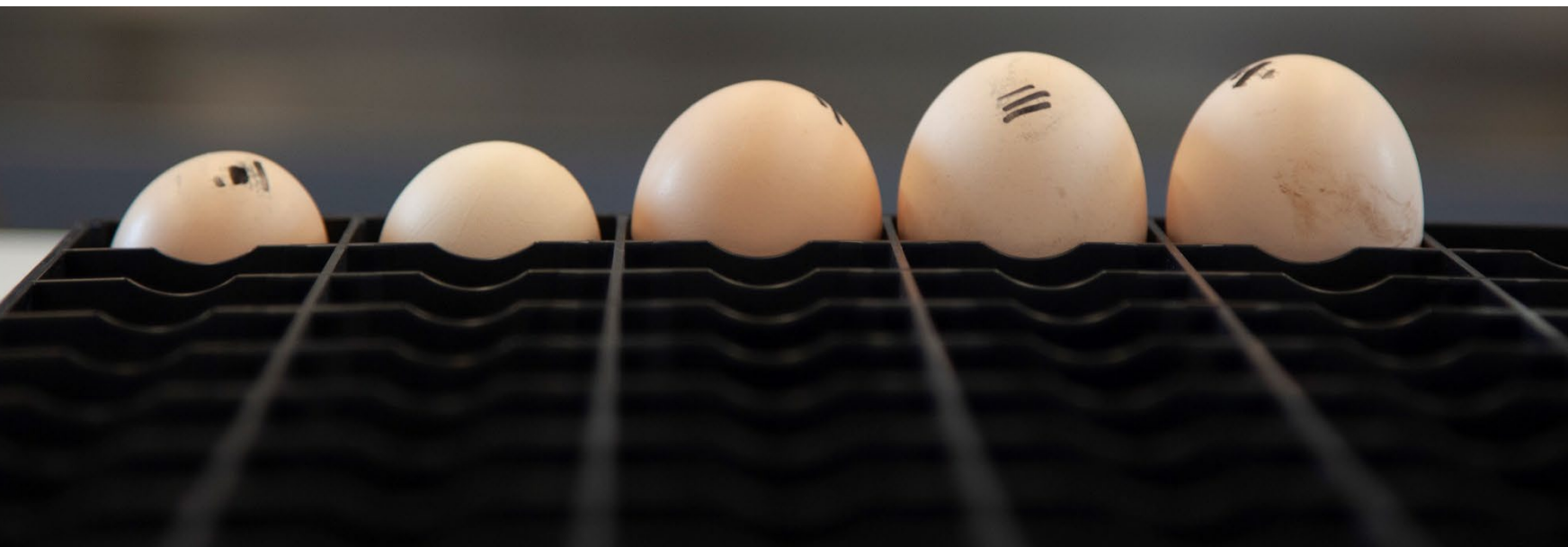
External quality

- **Quality is subjective -> different opinions**
- **Some factors can be scored objectively**
 - Weight: uniformity
 - Shell color
 - Malformity and cracks
 - Dirty eggs



External quality

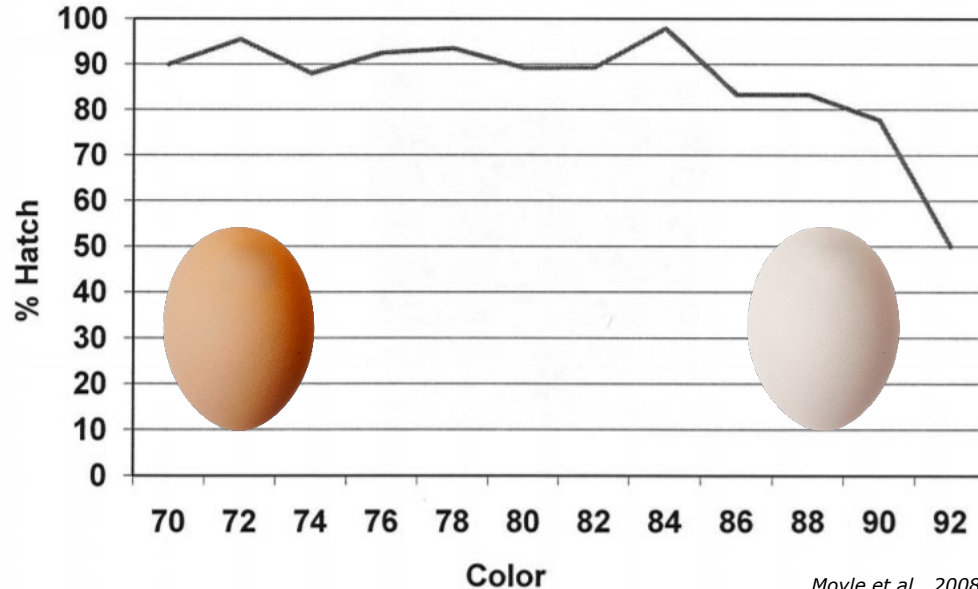
Uniformity



External quality

Shell colour and hatchability

Figure 1. Hatchability of commercial eggs by egg shell color code.



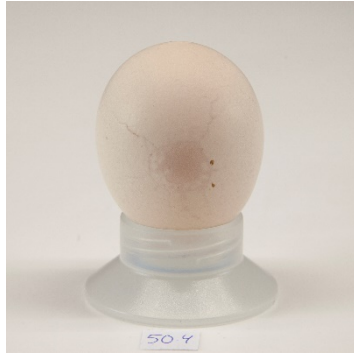
Moyle et al., 2008



External quality

Cracks and holes

Poor shell quality or rough egg handling?



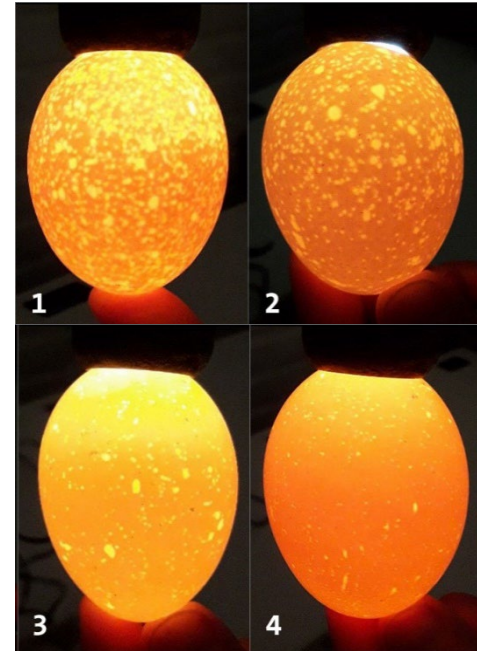
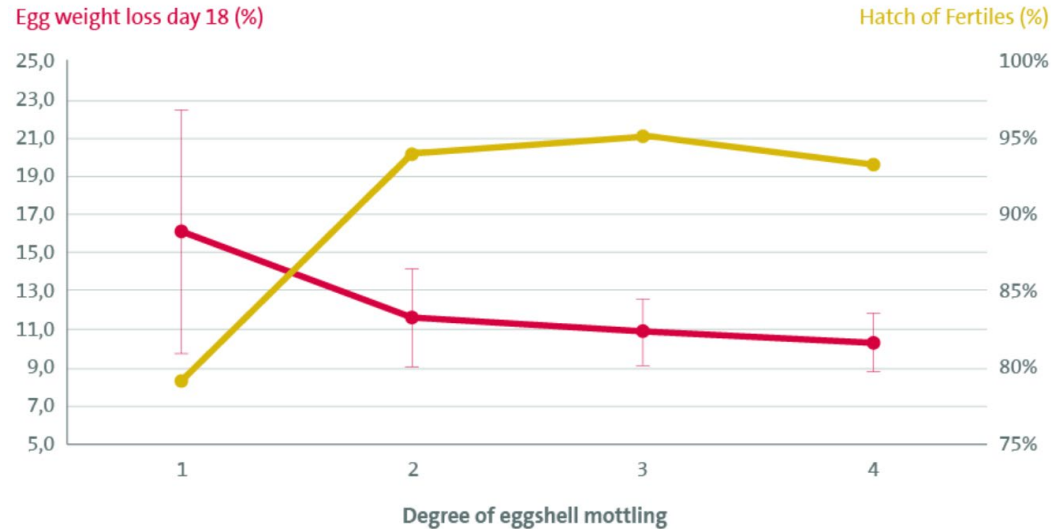
External quality

Malformities



External quality

Mottled shells and hatchability



External quality

Dirty eggs

- **Floor eggs**
- **Dirty eggs**
- **Sweating eggs**



External quality

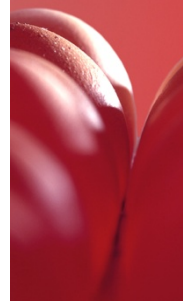
Recording form

Recording Form 8A: External hatching egg quality upon receipt

Egg ID-code		Breed	
Production date		Maternal age	
Date of receipt		Date of quality control	

Core temperature (5 – 10 eggs)	
-----------------------------------	--

Sample size		
Category	Number of eggs	% of sample
Dirty		
Misshaped		
Upside down		
Abnormal shell colour		
Poor shell quality		
Hairline cracks		
Big cracks		
Too small		
Too big		
Total		





Hatchery Talks

Egg handling



Egg handling

Egg handling

- **Egg disinfection**
- **Storage**
- **Heat treatment**



Egg disinfection

- There are a lot of micro-organisms on the surface of the eggshell.
- Micro-organisms can have detrimental effects on hatchability and chick quality.
- It is essential that the eggs are disinfected prior to incubation.



Contaminated hatching eggs

- **External**
 - Dirty eggs
 - Visual clean eggs
- **Internal**
 - External → internal
 - Vertical transmission



Egg handling

Hygiene

Contaminated hatching eggs may result in:

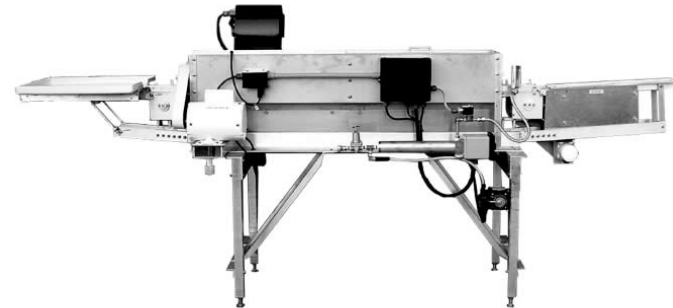
- Increased embryonic mortality
- Exploders → further contamination
- Yolk sac infection in day-old-chicks (increased 1st week mortality)



Washing of hatching eggs!

A good solution for poor egg hygiene?

- Essential rules are hard to follow
- If done improperly → more problems in hatchery



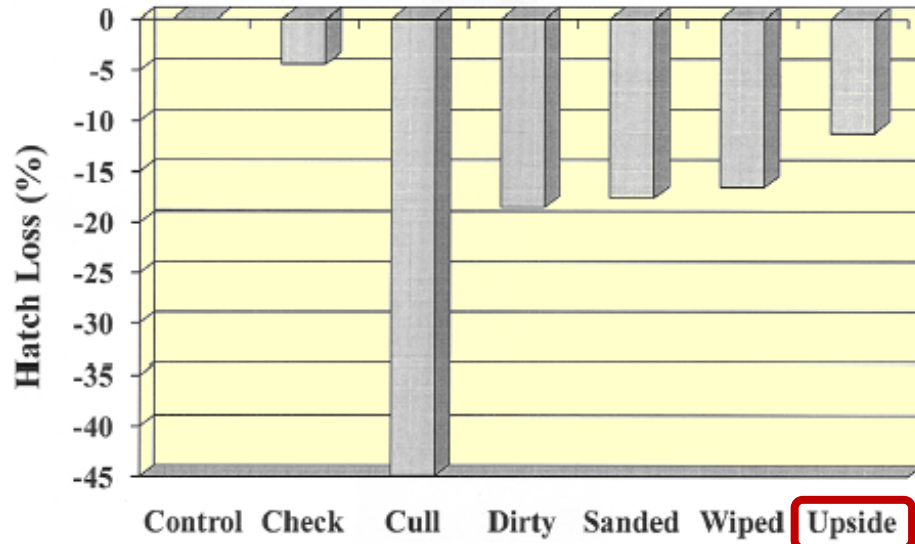
Storage

- Usually, storage of the eggs prior to incubation is unavoidable.
- Not recommended to start incubation within 12h of arrival at hatchery
- The storage time and the temperature and relative humidity at which the eggs are stored are very important for the hatching result.
- Storing is not only in hatchery!

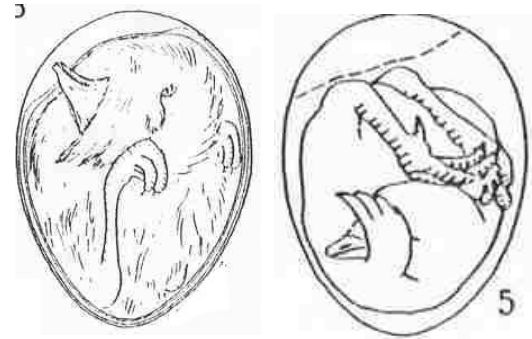


Upside down and hatchability

10 % eggs upside down =
1.2 % hatch of eggs set



Yoho et al., 2008



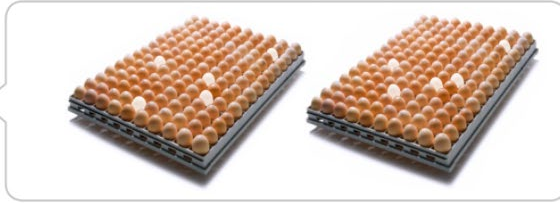
Egg handling

Upside down and hatchability

Manual setting



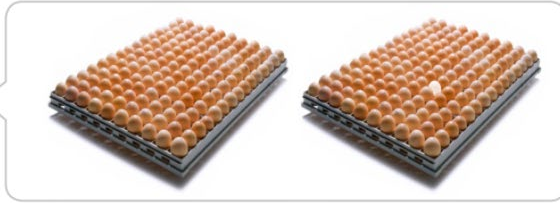
97.0%



Automatic setting



99.7%



$2.7\% \times 0.2 \times 52 \text{ million} =$ **280,800 extra**
day old chicks per year

(Hatchery capacity 1 million chicks per week)



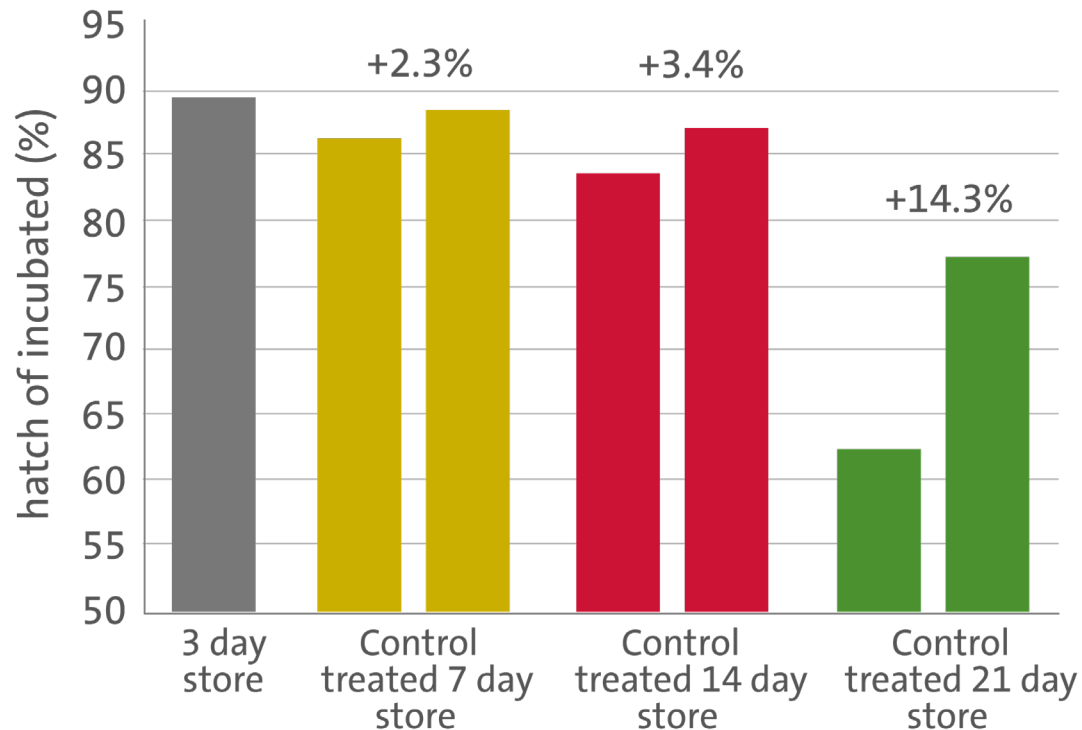
Heat treatment

- Aim is to bring embryo's to storage resistant stage or revitalize cells.
- Egg breakout from a sample is needed to monitor the embryo
- Can considerably reduce the negative impact of egg storage on hatchability.
- Navel quality will generally be much better
- The incubation time will also be closer to that of fresh eggs.



Egg handling

Heat treatment

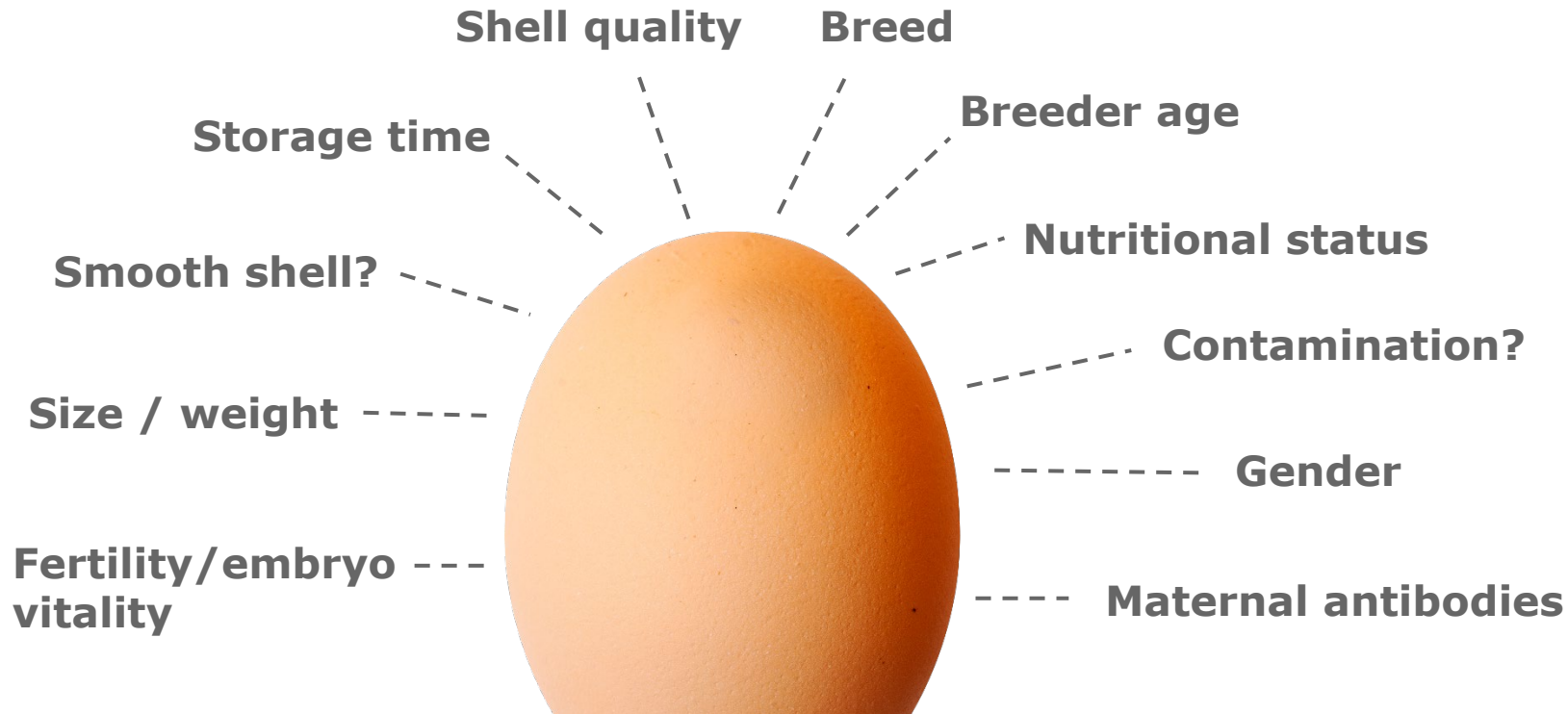




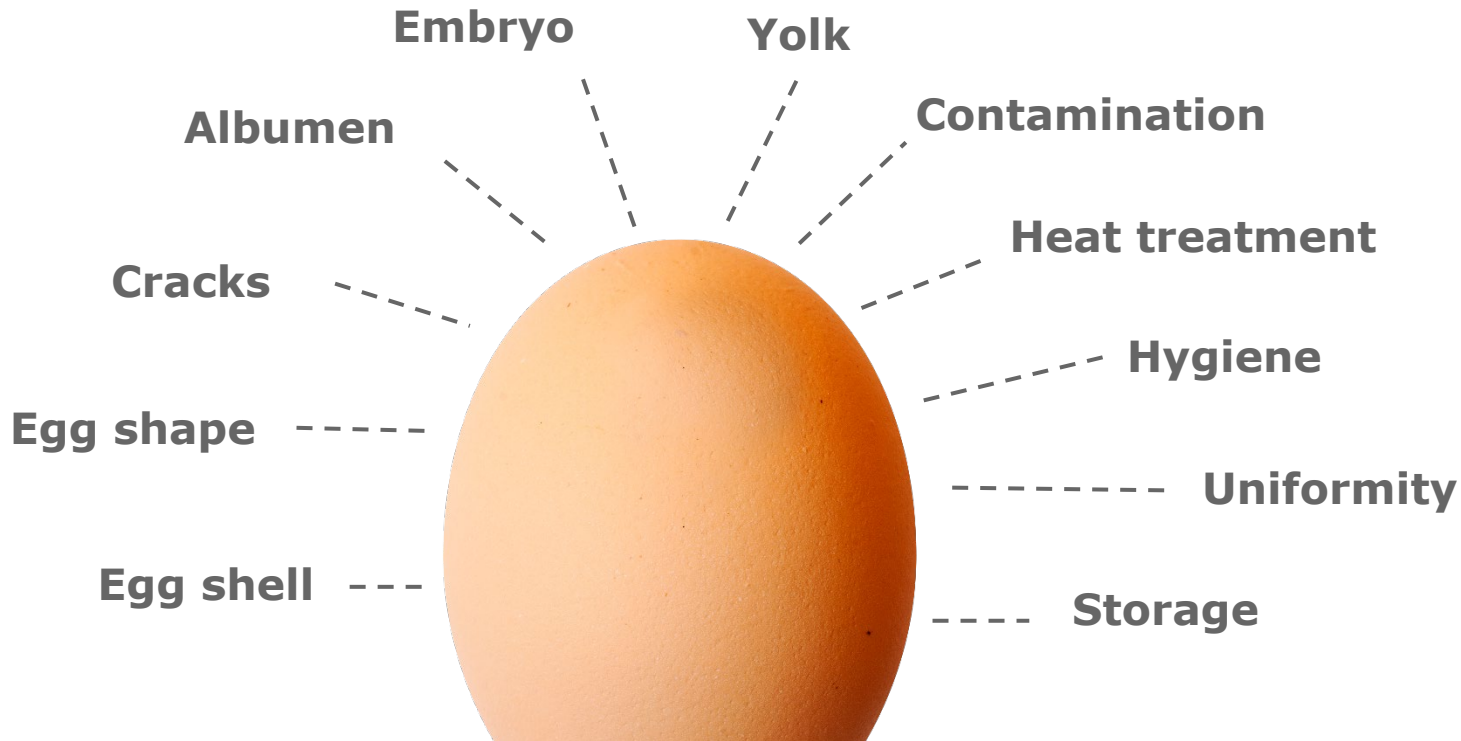
Hatchery Talks

Summary

Every egg is different to start



Checks for the best hatching egg



Thanks for watching!

- **Webinar-replay + hand-out**
- **Knowledge section at our website**

See you at our next webinar!





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