



# ***Egg Quality Management System from Farm to Fork***

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**A World of Food Solutions**

1. Why Egg Quality and Safety is Important ?
2. Key Gaps & Practices in Egg Production
3. Research on Egg Quality and Safety- Case Study
4. Biosecurity and Animal Health & Welfare Practices
5. Egg Processing and Quality Checks
6. Cold Chain of Eggs
7. Egg Products in QSR and Retail Market
8. Key Take Away

# Why Egg Safety Is Important ?

## A large outbreak of *Salmonella enteritidis* phage type 4 associated with eggs from overseas

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### SUMMARY

In February 1989 the largest reported outbreak to date in the United Kingdom of *Salmonella enteritidis* phage type 4 (PT4) infection occurred following a wedding reception at a hotel. One hundred and seventy-three people met the case definition of illness of whom 118 had the organism isolated from their stools. A further 17 were found to be *S. enteritidis* PT4 positive, but were asymptomatic. Lightly-cooked, egg-based sauces were the epidemiologically proven vehicles of infection. Investigations showed this outbreak to be the first to implicate imported European eggs as the source of infection. An unusual feature of this outbreak was a reported incubation period of less than 3 h for some of the confirmed cases of salmonellosis.

Symptoms	% Cases
Diarrhoea	87
Abdominal pain	84
Fever	75
Nausea	65
Muscle pain	64
Vomiting	24
Headache	21
Blood in stools	6



# Salmonella Outbreak in Egg and Egg Products



## Salmonella Food Poisoning by Food Group (1998 to 2002)

Food group	No. of confirmed case (%)	No. of persons affected (%)
<b>Egg and egg products</b>	<b>90 (36%)</b>	<b>415 (25%)</b>
Meat, meat products etc	48 (19%)	191 (12%)
Seafood	33 (12%)	203 (12%)
Poultry, game and their products	31 (12%)	236 (15%)
Others	40 (16%)	548 (34%)
Unknown	10 (4%)	35 (2%)
<b>Total</b>	<b>252 (100%)</b>	<b>1628 (100%)</b>

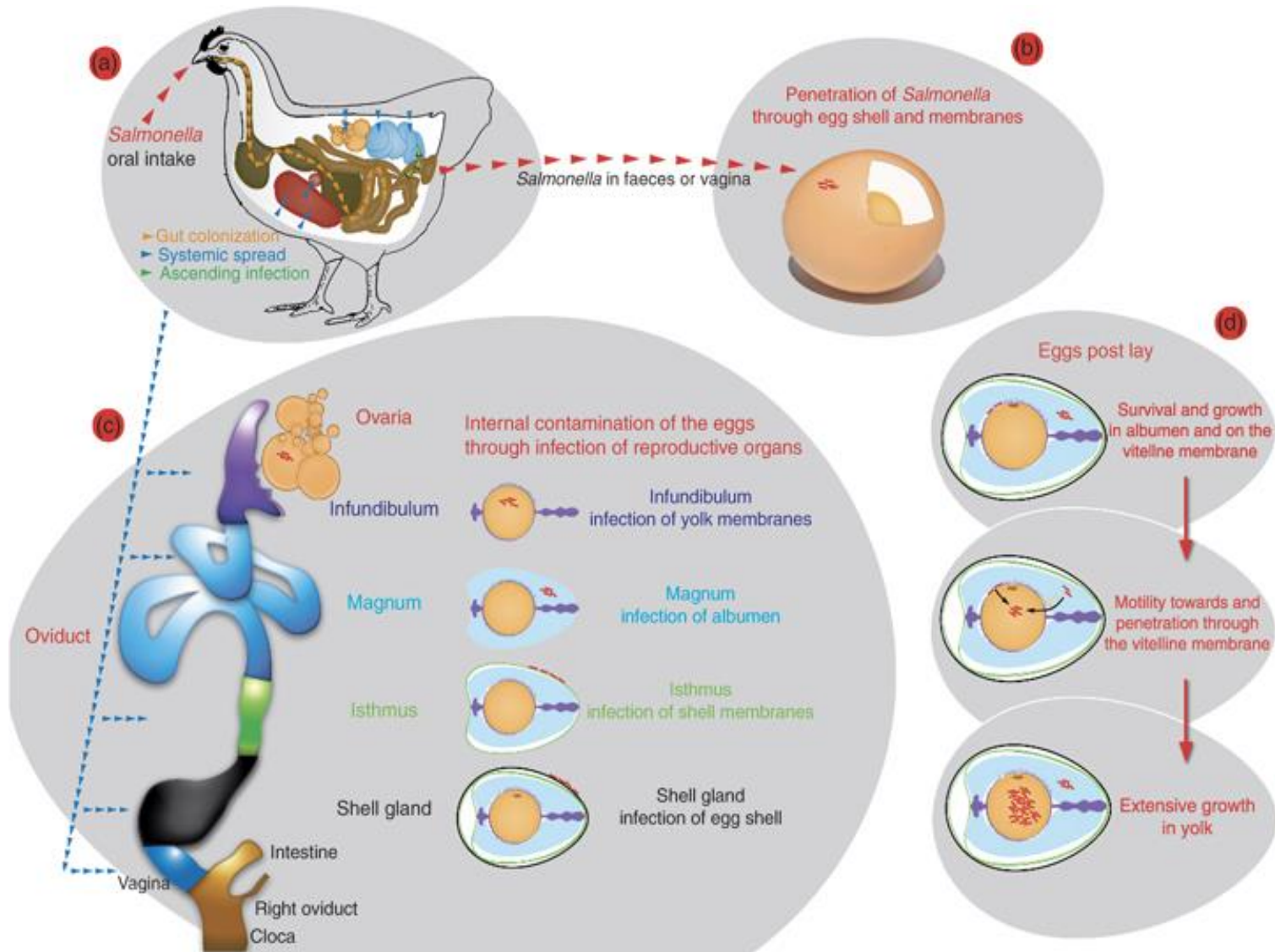
## Contributing Factors of Salmonella Food Poisoning Outbreaks Due to Consumption of Desserts (1998 to 2002)

Contributing factor	*Contributing factor in%
<b>Contaminated raw eggs</b>	<b>90</b>
Poor personal hygiene of handler	20
Improper holding temperature	13
Food prepared too far in advance	7
Contaminated processed egg	6
Inadequate cooking	4
Unknown	4

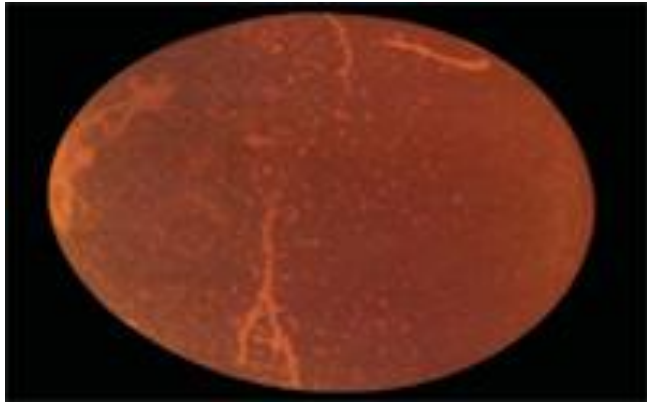
\* There may be more than one contributing factors in one case

Source : SALMONELLA IN EGGS AND EGG PRODUCTS December 2004 Food and Environmental Hygiene Department, HKSAR

# Major Source of Egg Contamination



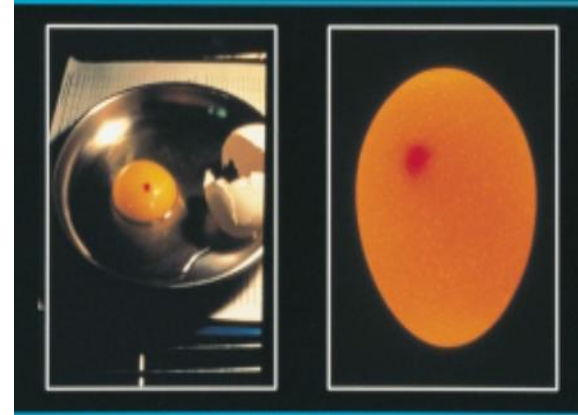
# Common Quality Issue in Eggs



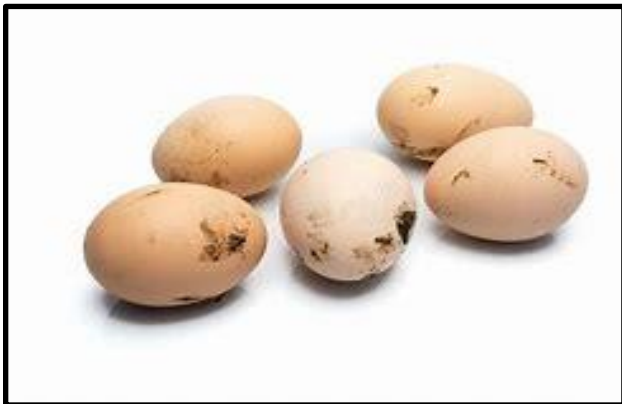
**Hairline Cracks**



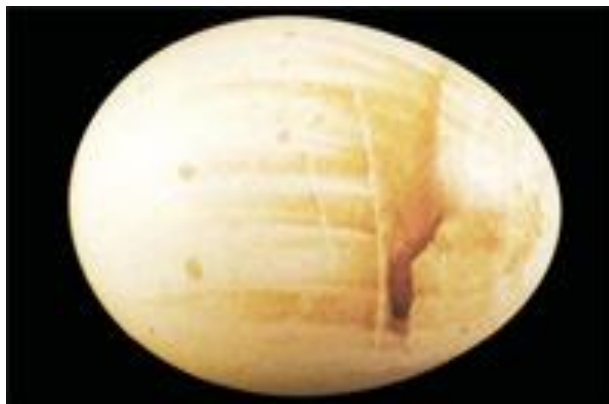
**Gross Cracks**



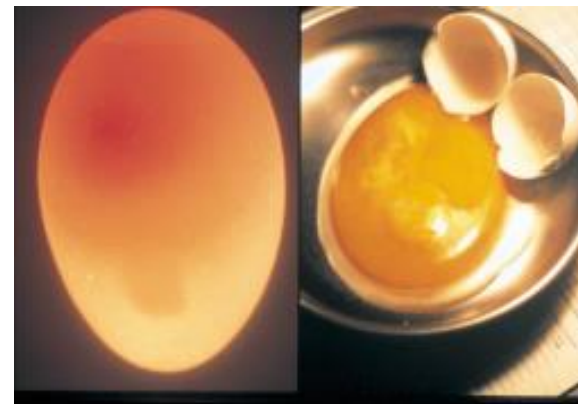
**Blood Spots**



**Egg with fecal material**



**Dirty stained egg**



**Candled and Broken-out  
Appearance of a Mixed rot**

# Key Gaps & Practices in Egg Production



## 1. Farm practices

- Inadequate Biosecurity and Animal Health and welfare practices
- Gaps in veterinary care program
- Improper cleaning and hygiene condition in the farm

## 2. Feed

- Inadequate quality of layer feed

## 3. Egg handling and storage

- Eggs are not collected and handled properly
- Long time of egg storage at ambient temp in the farm

## 4. Egg grading and processing

- Eggs are sold without grading and processing

## 5. Quality and safety Checks

- Eggs are not checking for minimum quality and safety parameters

## 6. Transportation and storage at store

- Development of hairline cracks and breakage of eggs during transportation
- Eggs are store at ambient temp in store room (bulk quantity)

## 7. There is no guideline and regulation on Eggs – Shelf life/Micro

# Research on Egg Quality and Safety-Case Study



MoU with Bombay Veterinary College, Parel, to conduct the research study on egg and meat

## ❑ Evaluate

- Physico-chemical quality of raw shell eggs
- Efficiency of chlorine sanitization of eggs
- Shelf-life of cleaned and sanitized eggs (stored under refrigeration) and achieved 62 days shelf life

## ❑ Assess

- Safety of fresh raw shell eggs for the presence of selected enteric pathogens with special emphasis on Salmonella spp. and Campylobacter spp
- Effect of sanitizers on artificially inoculated Salmonella Typhimurium on raw shell eggs
- Monitoring of flocks for Salmonellosis
- Safety of raw shell eggs for selected antibiotic and pesticides
- Standardize the time-temperature combination for hard boiling of eggs
- Evaluate the sensory and shelf-life of MAP packed shelled and unshelled boiled eggs at refrigeration temperature



# Biosecurity of Layer Farm



**Fencing of farms**

**Entry is  
Prohibited with  
the Gate &  
Security**

**Entry with the  
Decontaminator  
for Incoming  
Vehicles & People**

**Visitors and  
incoming vehicle  
records**

**Training of staff  
and workers**

**Proper Dead bird  
Disposal**

**Uniforms for  
Visitors &  
employees**

**Own feed Mill &  
Inspection of  
Feed**

**Control on  
migratory birds**

**Pest Control**

# Animal Health and Welfare of Birds



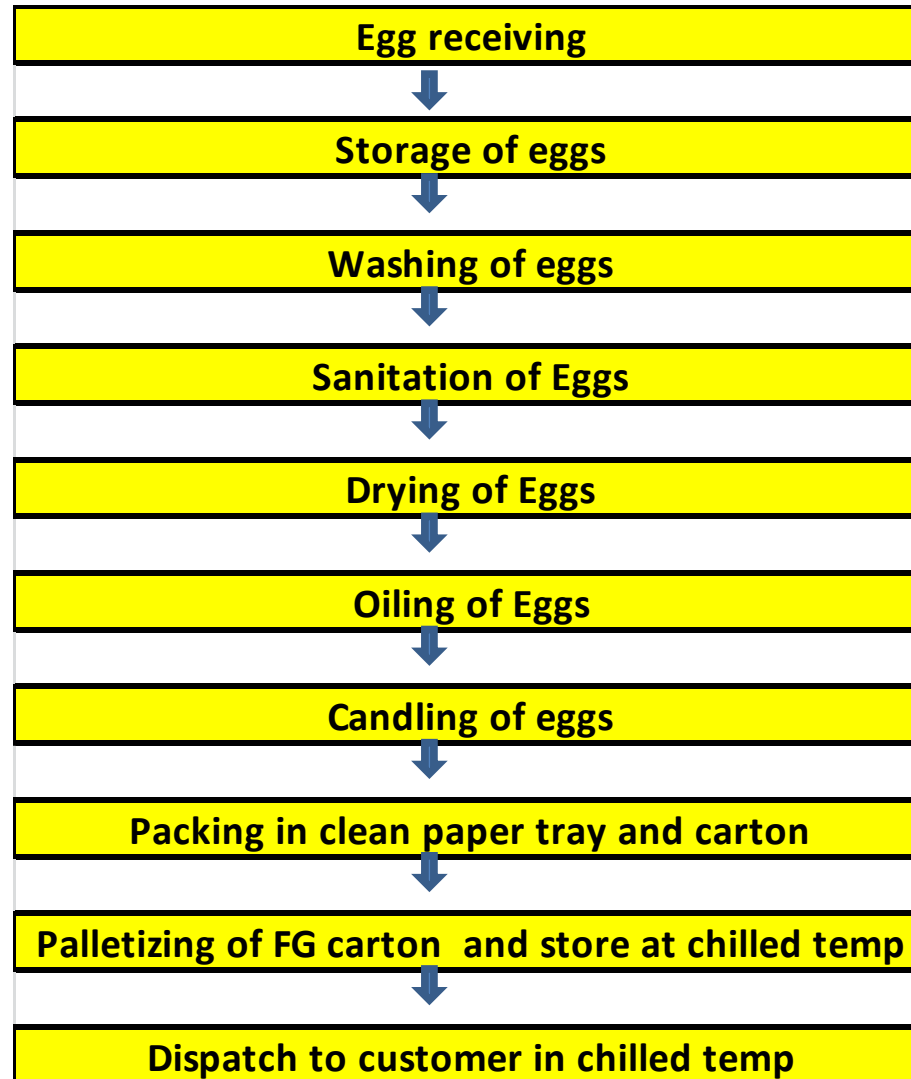
Area	Standard Practices
<b>Veterinary care program</b>	Cleaning & disinfection of farms
	Vaccination of birds
	Inspection of birds at least once in day
	Treatment of diseased birds
	Culling of weak birds by approved method
	Post mortem examination of birds
	Disposition of dead birds
	Disposition of manure
<b>Care taker</b>	Various training to care taker
<b>Housing Design and management</b>	Feeding, watering and environmental monitoring and control systems
	Back up generator requirement
	Lighting management
	Maintaining air quality mainly ammonia
	Management of house temperature
<b>Feed and water</b>	Laying hens shall have access to water and feed at will, with proper nutritional value of the feed
<b>Molting of birds</b>	Induced molting via feed and water withdrawal is prohibited
<b>Beak trimming</b>	Conducted when birds are 10 days of age or younger
	Second trim is undesirable and should not be performed routinely

# Flock Monitoring Practices & Records



## Sr.No. Farm Monitoring Practices & records

1	<b>Salmonella Monitoring</b>
	<b>Layer breeder Flocks Testing</b>
	5 % Production
	<b>Hatchery Monitoring</b>
	Dead in Shell
	<b>Commercial Flock</b>
	Blood Sample report L
2	<b>Layer Flocks sera monitoring for IBD and ND</b>
	20 samples/flock
3	<b>Residue Monitoring Plan for Shell Eggs Antibiotics, Pesticide &amp; Insecticide</b>
	Testing at External accredited lab
4	<b>Water Sample Report</b>
	MPN for main tank treated water
5	<b>Feed Analysis Report</b>
	Proximate & Aflatoxicosis
6	<b>PM finding Report</b>
	Visit of In house Veterinarian -need based for monitoring flocks and its record
7	<b>Flock Performance Report</b>



## Microbiological analysis

- TPC, E. Coli, S. aureus and Salmonella spp.

## Residue analysis

- Antibiotics, Pesticides and Heavy Metal

## Physical analysis

- Egg weight, shell thickness, color, odour, yolk color

## Water

- Total hardness, pH, MPN, E. coli and residue (IS10500)

## Packing Material

- Bursting Strength, Cobb test (water absorption), GSM



- All chilled eggs transported through refrigerated vehicle from farm to consumer at 0 to 4°C temperature
- Control of temperature and humidity during storage of eggs help to maintain freshness and quality of raw eggs for longer time.
- Maintain cold chain at restaurant till point of consumption
- Eggs shell disposal and handling properly.

# Egg Products in QSR



# Branded Eggs in Markets



# Key Take Away ...

- **Consumer awareness:**
  - Egg is cheapest source protein and big opportunity to increase per capita consumption of Eggs in India.
  - We have to increase consumer awareness about Egg nutrition, quality and Safety.
- **Improvement in Farm practices**
  - There is necessary to strengthen Biosecurity of farms to prevent disease in the birds and improve overall quality of eggs and avoid Bird flu like crisis.
  - Implementation of good Animal health and welfare practices help to increase welfare of birds , quality & safety of eggs and productivity.
- **Grading and processing of eggs**
  - Graded eggs play key role to increase consumption of eggs due to reduce waste, confusion and uncertainty with respect to quality of eggs and higher preference for clean and defect free eggs
  - Effectively use of GHPs, GMPs, HACCP, risk analysis, performance criteria etc as a tool for achieving good quality an safety of eggs.
  - Egg processing and cold chain ensure safety and increase shelf life of eggs
  - Egg quality checks are increase confidence about good quality and safety of eggs.
  - Egg products in QSR segment and demand of Braded eggs markets are continuously increase in India
- **Development of specific guideline and regulation on Eggs and Egg Products**

# Let us Lead ....



# Thanks