

# **Good Husbandry Practices in Poultry Production to Ensure Environment and Food Safety**



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# Background

- Good husbandry practices in poultry production are required to maximize growth and production as per genetic potential
- These practices seldom take the environment and food safety issues in consideration
- Reduction of infection in and/or contamination of live birds with foodborne pathogens is important
  - before poultry products are dispatched to processing plants



Good Animal Husbandry Practices (GAHPs) are the keys to main control strategy (Hafez, 1999)

- Keeping production site clean by destroying infected flocks
- Sanitizing table/hatching eggs and
- Limiting the introduction and spread of pathogens at the farm



# Pathogenic Microorganisms

*Salmonella*

*Campylobacter*

*Escherichia coli*

*Clostridium perfringens*

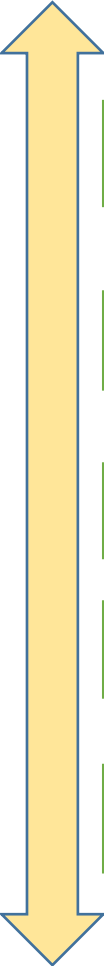
*Listeria species*

## **Concentrate efforts to know:**

- ✓ How microbial pathogens enter and move through food chain
- ✓ How live birds and eggs are contaminated/polluted
- ✓ The conditions that promote or inhibit the growth of microorganisms threatening environment and the food safety



# Major Good Animal Husbandry Practices (GAHPs)

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- Effective hygienic measures in poultry houses having adherence to biosecurity
  - Hygienic measures for feeds
  - Use of antimicrobial safe feed additives
  - Careful vaccination of poultry flocks
  - Application of hygienic systems during harvesting and transporting birds



# Sanitizing Table/Hatching Eggs

- Eggs are 90% sterile when laid
- Contaminated with bacteria from different sources e.g. **feces and surrounding environment**
- Internal contents of egg (albumen and yolk), are ideal growth media for pathogenic bacteria which are hazardous to humans (e.g. *Salmonella*, *Escherichia* or *Enterobacter*)
- Contamination may be directly (vertical transmission) as a result of bacterial shedding infection from the hen's reproductive organs (**Messens *et al.*, 2005**)
- Contamination also occurs **during the passage of the eggs through the highly contaminated cloaca area** (horizontal contamination) at the moment of lay and leads to the penetration of shells by microorganisms (**De Reu, 2006**)



## Sanitizing Table/Hatching Eggs

- Much of the current research on eggshell and content contamination focuses on Salmonellosis
- Outbreak of this disease in humans caused by *Salmonella enteritidis* following consumption of food containing contaminated eggs or their products still represents major food safety problems
- Important is to reduce the contamination in production chain as far as possible and as far as practicable
- Sanitization of eggshells is important both for table and hatching eggs due to the higher incidence of contamination with pathogens (Turtoi and Borda, 2014)



## Sanitizing Table/Hatching Eggs

- Most disinfectants are helpful in the control of *Salmonella* spp and other microorganisms but not able to eliminate contamination
- Chemical treatments do not consistently kill all *Salmonella* spp on or in eggs
- Efficacy appears to diminish as the amount of time between contamination and treatment increases (**Berrang *et al.*, 1998; 2000; Cox *et al.*, 2000**).





## Sanitizing Table/Hatching Eggs

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- Drawbacks of chemical sanitization lead to alternative methods:

➤ Immersion in boiling water for 3 seconds (*Hemathongkham et al., 1999*)

➤ UV light treatment (*De Reu et al., 2006; Wells et al., 2011*)

➤ Hot air (180<sup>0</sup>C for 8 seconds) treatment

➤ Hot water (95<sup>0</sup>C for 10 seconds) treatment

➤ Infra-red (210<sup>0</sup>C for 30 seconds) treatment

➤ Steam (100<sup>0</sup>C for 2 seconds) treatment

(*James et al., 2002*)



# Hygienic Measures in Poultry Houses

- Visitors to poultry houses and its surroundings should be strictly prohibited
- Main gate and the doors of houses should be kept locked
- Farm staff working there should take all possible precautions before and after entering into houses
  - Taking shower
  - Wearing protective cloths
  - Using disinfectant footbath and
  - Undergo routine health check up of their own to identify carriers and prevent transmission and cross-contamination on the farm
- Ensure a stress free environment for the birds
- Follow all-in all-out” rearing system



## Hygienic Measures in Poultry Houses

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- Cleaning and disinfection with a safe powerful cost-effective disinfectant and constitute routine hygienic measures in the farm
- Houses should be left empty for 2-4 weeks before introducing a new flock
- Procure birds from “clean” and “known” source
- Supply clean and safe drinking water
- Regular cleaning and disinfection of feeders, waterers and all other equipment
- Dead and sick birds should be immediately disposed off following scientific methods



# Feed Hygiene

- Quality feed is always preferred for feeding poultry
- Feed free of contamination is one of the criteria for quality feed
- Most common source of infection is the *Salmonella* –contaminated feed
- Contamination of feed ingredients as well as the finished feed needs to be reduced
- A number of approaches are being in practice for this purpose



### Some of the approaches for feed hygiene:

- Keeping feed mill rodent free
- Procurement of quality raw materials
- Decontamination by mechanical methods (Pelleting, pasteurization etc.), physical (extrusion, irradiation) or chemical methods (acid treatment)
- Strict separation of clean and dirty parts of a feed mill (the clean part starts directly after the treatment of the feed)
- Reduction of dust contamination
- Hygienic storage of all feed ingredients
- Regular cleaning and disinfection of feed mill
- Introduction of cleaning and inspection programs of the feed transportation vehicles.



# Use of Safe Feed Additives

- Manufacturers claim their products as safe and performance enhancers
- Unfortunately, most of them are not passing through check post or field trial in BD
- Necessary to establish a screening or quality control system

## Acidifiers

- Lactic acid
- Fumaric acid
- Citric acid
- Propionic acids
- Salts of acids

## Probiotics

- Lactobacilli
- Streptococci
- Bifidobacteria
- Bacilli
- Yeasts



## Use of Safe Feed Additives



- No antibiotics
- No Growth promoters



- Organic acids in drinking water/feed improve gut health by creating acidic environment unfavorable for the colonization of *Salmonella*
- Multi-strain probiotics are able to inhibit the growth of potentially pathogenic microorganisms by lowering pH through production of lactate, lactic acid and volatile fatty acids
- Both acidifiers and probiotics are viable and safe alternatives to antibiotics for growth promotion and safe poultry food production
- Researches to find out safe and cost effective feed additives as alternatives to antibiotics are advancing well in Bangladesh





# Careful Vaccination of Poultry Flock

- Along with biosecurity measures, vaccination is a preventive strategy to combat the outbreak of infectious diseases
- Since “one gram of prevention is better than a kilogram of cure” (Chowdhury, 1984), preventive strategy is the key to keep poultry healthy
- Different live and inactivated vaccines have been developed globally although type of vaccines produced in Bangladesh is few
- Take adequate care during transportation, preservation, storage and application of vaccine
  - to make vaccination effective
  - to avoid any sort of contamination



## Careful Vaccination of Poultry Flock

- Vaccines available commercially are limited for *Salmonella typhimurium* and *Salmonella enteritidis* infections
- Vaccine do not eliminate infection but reduced the number of carriers in flocks previously infected with a field strain of *Salmonella* (Meyer *et al.*, 1998)
- Application of live and inactivated vaccines to reduce *Campylobacter* colonization
- As *Campylobacter* is commonly present in the farm environment, it is extremely difficult to keep chicken flocks free of infection during production stage (Umar *et al.*, 2016)
- Current researches are addressing these issues

# Hygienic Harvesting and Transportation of Live Birds and Eggs

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- Cleaning and disinfection of equipment in collecting live birds and eggs
- Proper care to minimize stress on the birds during loading, unloading and transportation
- Assigning trained personnel for supervision for this purpose
- Vehicles with different systems to transport live birds and eggs are available e.g.
  - loose containers for birds
  - containers that are fixed
- Whatever system is available, no compromise in cleaning and disinfection of vehicles and the containers
- Withholding feed from the birds travelling to slaughtering plant a few hours before slaughter to prevent contamination by defecation



# Conclusions

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- Good husbandry practices must be followed for enhancing productivity and ensuring environment and food safety
- Since *Salmonella*, *Campylobacter* and *Escherichia* are the major players in making foods of poultry origin unsafe, application of all or even part of measures mentioned here could probably reduce their prevalence to an accepted level
- More researches are needed to address the key issues relating to potential immune intervention for the production of safe poultry and poultry products

