Quality management for processed poultry products and food safety

Syed Sayeem Uddin Ahmed, PhD

ahmedssu.eph@sau.ac.bd

$$p(D+)=\frac{AP-(1-Sp)}{1-[(1-Sp)+(1-Se)]} \quad AF_e = (RR-1)/RR$$

$$R= 1 - e^{-I\Delta t} \quad P = I * D \quad (x+a)^n = \sum_{k=0}^{n}\binom{n}{k}x^k a^{n-k}$$

$$RR=\frac{p(D+|E+)}{p(D+|E-)} \quad Y=\beta_0 +\beta_1 X_1+\beta_2 X_2 + \varepsilon$$

Food quality is a sensory property that includes appearance, taste, nutritional value (nutrient content), health benefit (functional ingredient) or safety (chemical, physical, biological)

It includes those attributes which affect consumer's choice for a product

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Objective of quality managements of poultry products:

Safeguard the health of the people through production, distribution and consumption of safe poultry products

Prevent avoidable losses and increase profitability

Promote national and international trade

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"Processed poultry product" includes a range of products – namely, a slaughtered carcass to a further processed product such as sausage, fillet, hot wings, nugget and so on

Consumer demand for variety is forcing constant expansion of the processed poultry product range

Preferences of the consumers have shifted towards healthy, tasty foods, which are readily available, ready to eat and easily stored

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Ready-to-eat (RTE) products, which are safe to consume regardless of the form when purchased by customers - While most RTE meat and poultry products are covered by specific lethality performance standards

Not-ready-to-eat (NRTE) products require cooking by consumers for safety

Whole chicken

Cuttings of chicken

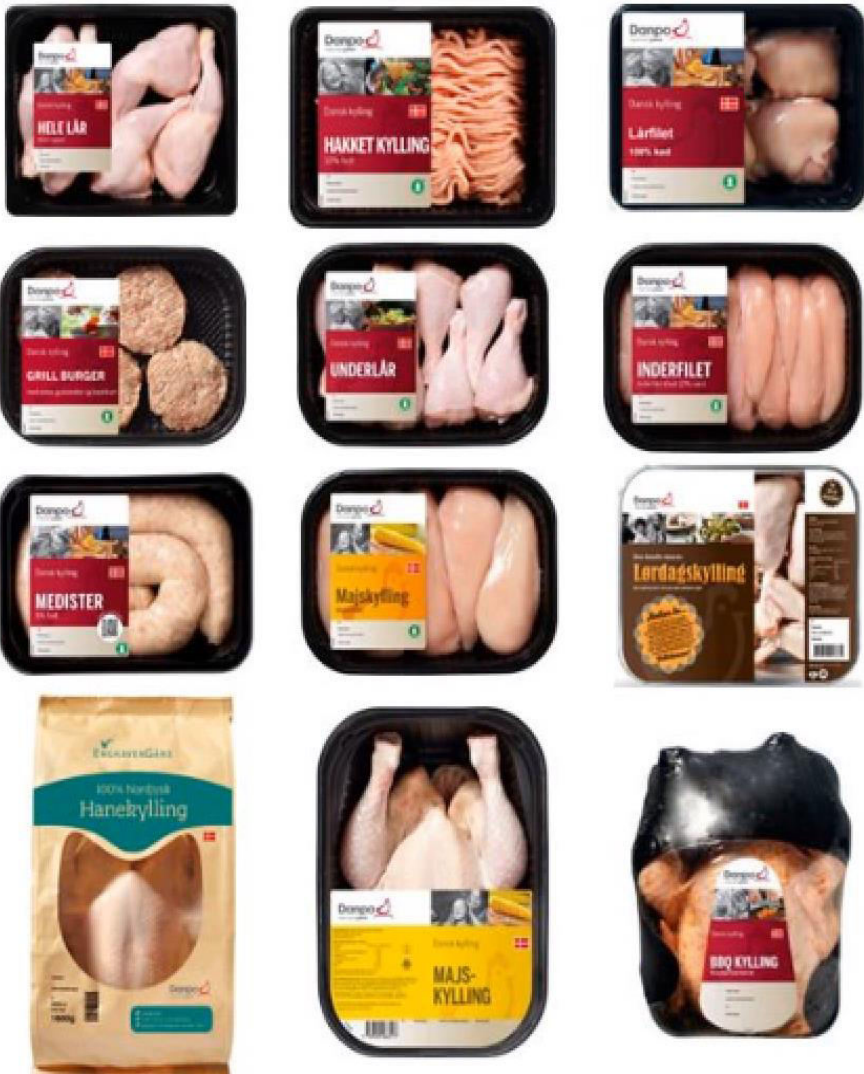Grill range, seasoned

Strips, cubes, minced

Sausages

Several packing possibilities

Conventional meat quality and corn-fed premium

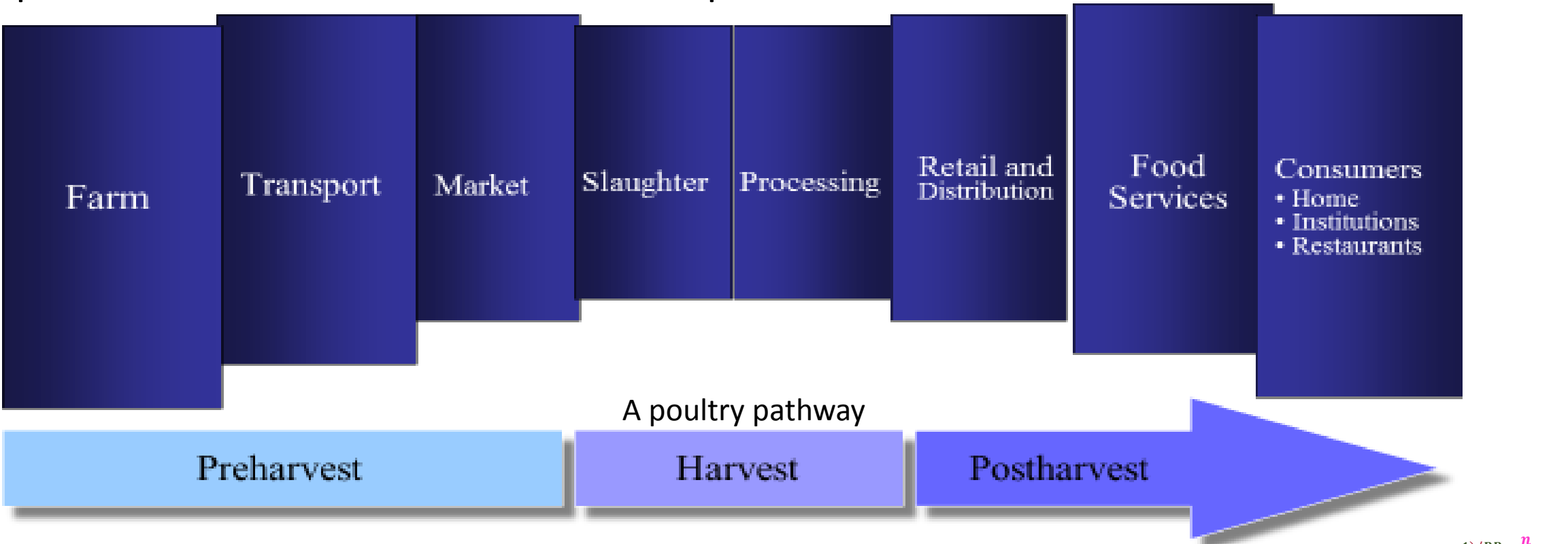Air-chilled for optimal meat structure and taste experience

Danish chicken only

Approved halal

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Poultry production system for the finished product, poultry must be viewed as an integrated system, from the farms to the food itself. Everyone including farmers, processors and regulators have a responsibility to assure consumers that poultry product is safe and suitable for consumption

| Farm | Transport | Market | Slaughter | Processing | Retail and Distribution | Food Services | Consumers
• Home
• Institutions
• Restaurants |

A poultry pathway

| Preharvest | Harvest | Postharvest |

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Major challenge for poultry industry is to maintain the quality as perceived by the consumers

- Increasing product safety regulation

- Complex and consolidated supply chains

- Technological advances in testing

- Identification of new pathogens

- Economic pressures/cost-cutting
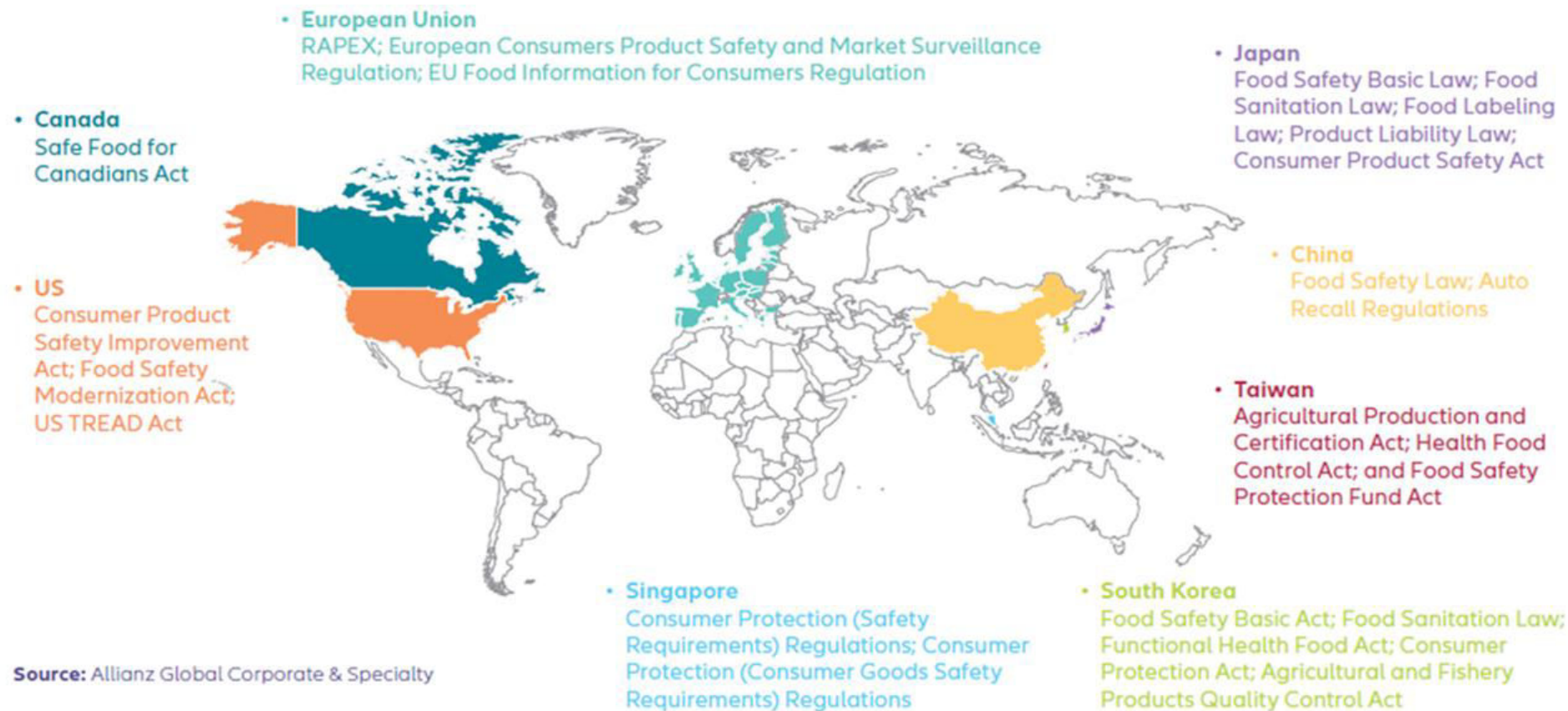
- Rise in consumer awareness/use of social media

- Retailer/original equipment manufacturer pressure

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RECENT REGULATIONS AND NETWORKS IMPACTING THE PRODUCT RECALL LANDSCAPE INCLUDE:

- **European Union**
  RAPEX; European Consumers Product Safety and Market Surveillance Regulation; EU Food Information for Consumers Regulation

- **Japan**
  Food Safety Basic Law; Food Sanitation Law; Food Labeling Law; Product Liability Law; Consumer Product Safety Act

- **Canada**
  Safe Food for Canadians Act

- **China**
  Food Safety Law; Auto Recall Regulations

- **US**
  Consumer Product Safety Improvement Act; Food Safety Modernization Act; US TREAD Act

- **Taiwan**
  Agricultural Production and Certification Act; Health Food Control Act; and Food Safety Protection Fund Act

- **Singapore**
  Consumer Protection (Safety Requirements) Regulations; Consumer Protection (Consumer Goods Safety Requirements) Regulations

- **South Korea**
  Food Safety Basic Act; Food Sanitation Law; Functional Health Food Act; Consumer Protection Act; Agricultural and Fishery Products Quality Control Act

Source: Allianz Global Corporate & Specialty

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The International Organization for Standardization (ISO) is a worldwide group that organizes and standardizes quality requirements

The American National Standards Institute (ANSI)
and
European Committee for Standardization (CEN)

do not produce standards, but member groups voluntarily submit standards for standardization and compliance.

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Bangladesh Food Safety Authority (BFSA)

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Poultry products are among the highest-risk categories, as evidenced by frequent recalls and safety scandals that impact public health

Canadian Food Inspection Agency

Home → About the CFIA → Newsroom → Food Recall Warnings → Complete Listing → 2018-03-28

Food Recall Warning - Harvest Creek brand Chicken Nuggets recalled due to Salmonella

Recall date: March 28, 2018

Reason for recall: Microbiological - Salmonella

United States Department of Agriculture
Food Safety and Inspection Service

Topics / Recalls and Public Health Alerts / Recall Case Archive / Archive / 2017 / H-E-B Meat Plant Recalls Poultry Products Due To Misbranding and Undeclared Allergens

News Release

H-E-B Meat Plant Recalls Poultry Products Due To Misbranding and Undeclared Allergens

105-2017
Oct 3, 2017

Class II Recall
Health Risk: Low

En Español

Congressional and Public Affairs
Benjamin A. Bell
(202) 720-9113
Press@fsis.usda.gov

The Guardian

Food safety

Egg contamination scandal widens as 15 EU states, Switzerland and Hong Kong affected

Brussels spokeswoman says situation is evolving as two men remain arrested following raids in Belgium and the Netherlands

Daniel Boffey in Brussels and Kate Connolly in Berlin
Fri 11 Aug 2017 17.23 BST

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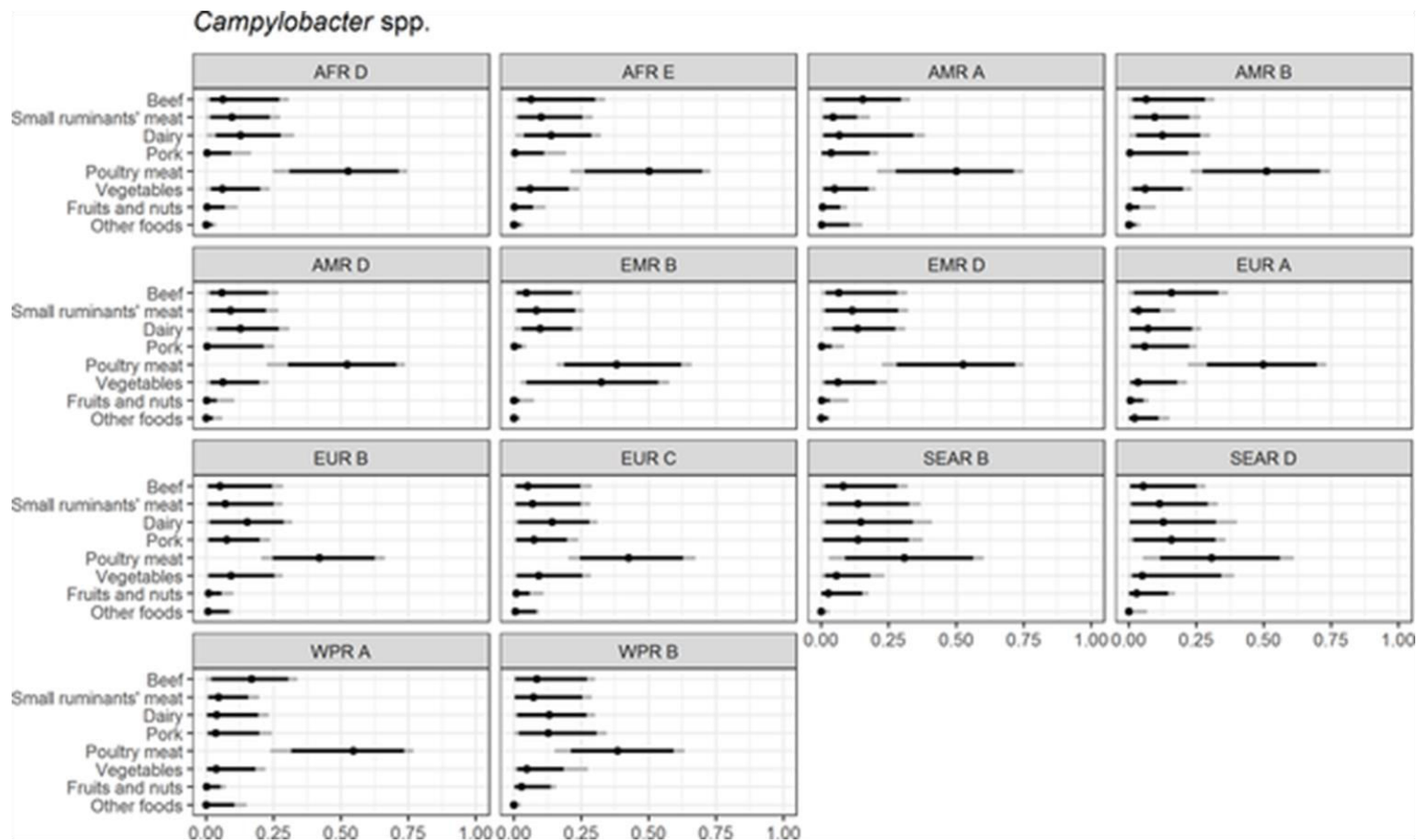
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Campylobacter spp.

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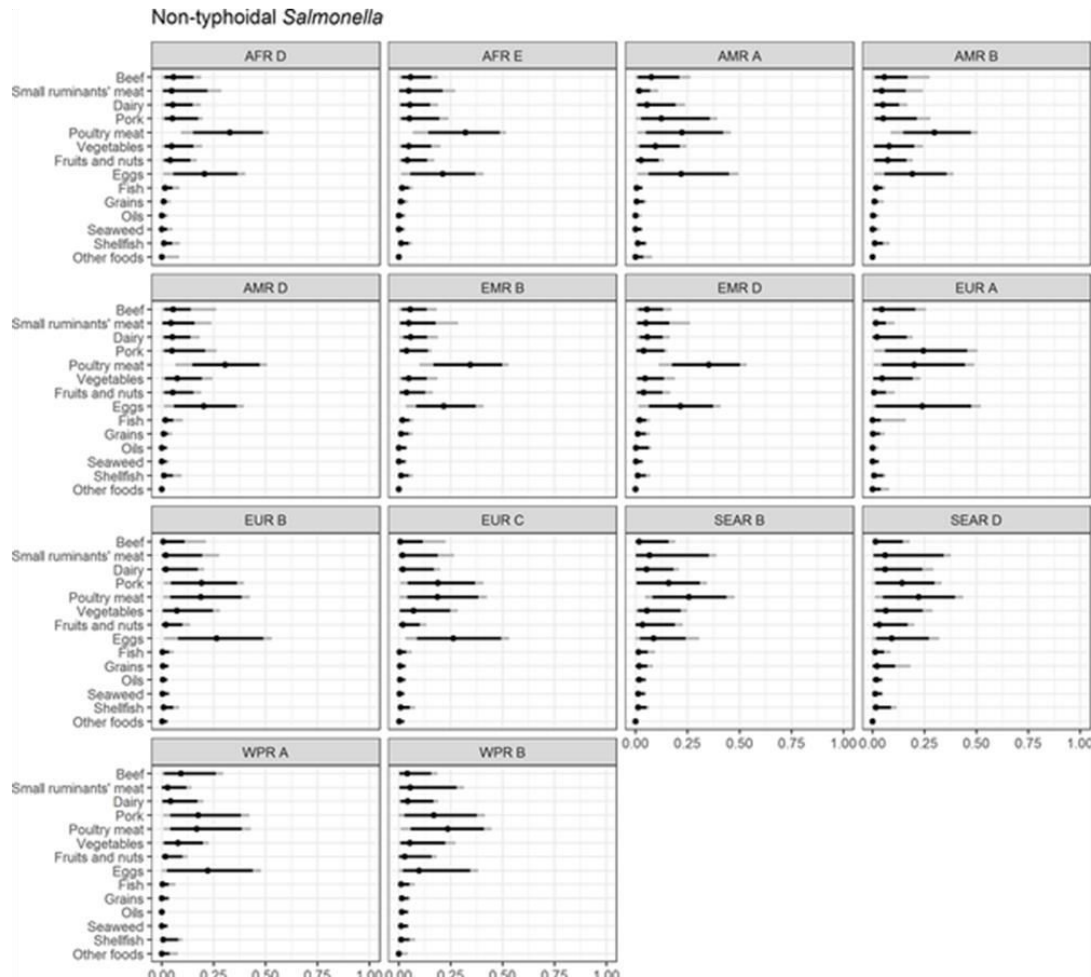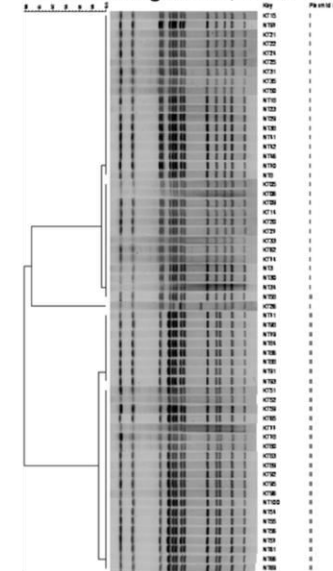
Non-typhoidal *Salmonella*

Figure 2. Dendrogram showing the cluster analysis on the basis of Xbal-PFGE of the 30 Salmonella Kentucky and 30 non-serotyped isolates obtained from commercial layer poultry farms in Bangladesh, 2009–2010.

Barua H, Biswas PK, Olsen KEP, Christensen JP (2012) Prevalence and Characterization of Motile Salmonella in Commercial Layer Poultry Farms in Bangladesh. PLOS ONE 7(4): e35914. https://doi.org/10.1371/journal.pone.0035914
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0035914

Hoffmann S, Devleesschauwer B, Aspinall W, Cooke R, Corrigan T, et al. (2017) Attribution of global foodborne disease to specific foods: Findings from a World Health Organization structured expert elicitation. PLOS ONE 12(9): e0183641.
https://doi.org/10.1371/journal.pone.0183641
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0183641

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- Quality assurance resides independent of manufacturing and operations and resides within process management

- Proactive activities

- Intended to prevent the production of noncompliant poultry products

- Quality control resides within manufacturing and operation

- Reactive activities

- Detect and set aside noncompliant poultry products using inspection and testing. and quality control

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Quality assurance

- Safe and quality input materials
- Calibration and cleaning of essential equipment
- Waste removal
- Vehicle inspection
- Good manufacturing and good hygienic practice audit
- Managing product-testing and results
- Packaging and label auditing
- Managing customer complaints
- Visiting customer establishments
- Shelf life studies
- Nutritional profiling.

Quality control

Meat identification
Freshness control
Grading
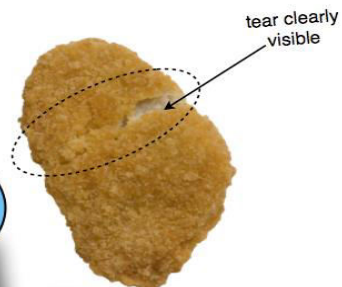Identify residues and biotoxins,
Standard size control
Defectives check
Identifying indicator organisms and pathogens

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4" x 6"
Laminated Cards
Full Color
36 Total

Further Processed Boneless Nuggets #10

tear clearly visible

Further Processed Bone-In Wings #8

cut not at joint, material removed

Defect: Miscut

*product is shown **actual size** on the front

Further Processed Boneless Patties #4

each larger than 1/2 inch void, continuos area
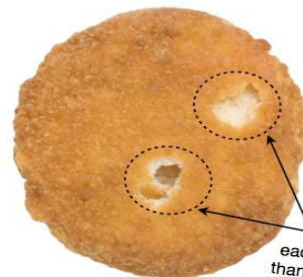
Defect: Coating Void

*product is shown **actual size** on the front

set includes boneless and bone-in products

Actual Size on the Front

Grading Details on the Back

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Microbiological tests:

- Indicator organisms: Coliforms, Enterobacter species, Staphylococcus, lactic acid bacteria, yeast and mold

- Pathogens: Salmonella, Campylobacter, Listeria, E. coli, STEC

Chemical tests:

- Contaminants: pesticides, antibiotics, drugs, veterinary residues, heavy metals

- Allergens, including gluten

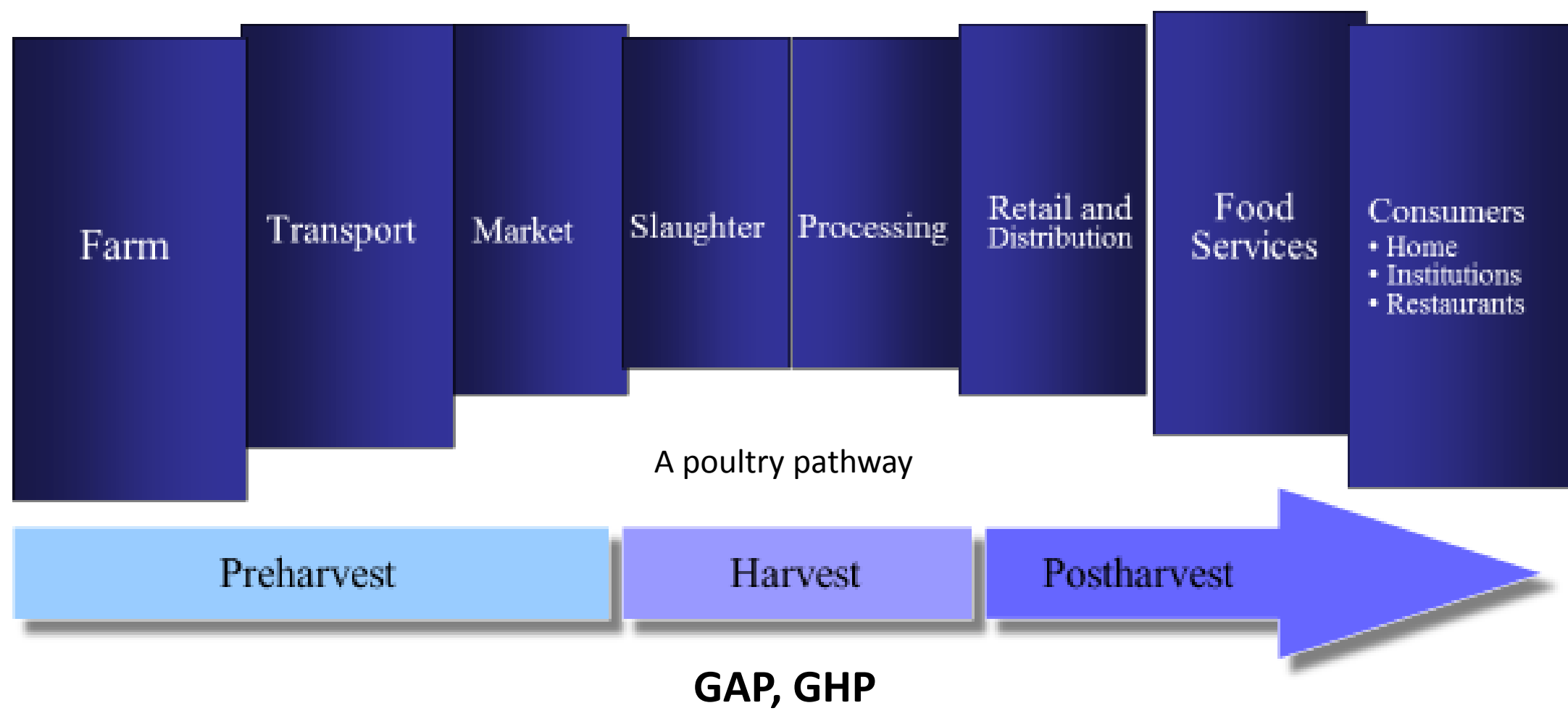- Proximates (ash, fat, protein, moisture salt)

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Nutritional tests and quality indicators:

- Full nutritional panels (calories, carbohydrates, fat and fatty acids)

- Minerals (calcium, iron, phosphates, sodium nitrate)

- Bone percentage

- Added water, added phosphate

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A poultry pathway

GAP, GHP

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Quality management system

Self-developed system
Quality programs used in the industry

General quality management systems provide quality control tools used in the industry

- These include Total Quality Management (TQM)
- Zero-defect systems
- Six sigma,
- HACCP

Only portions of the systems have been implemented to any extent after tailoring in the poultry-processing industry

(Dr. Fred Benoff, in Broiler Industry Magazine)

General quality management systems are based on statistical principles, it is applied during the production process in the attempt to provide real-time data to allow the process to be corrected before many defects are created

X bar charts, R bar charts, histograms, attribute charts, moving-average and range charts, process capability charts, Pareto diagrams, and other tools. Using one or more of these enables a process operator the opportunity to take data, analyze them

Risk analysis and Simulation
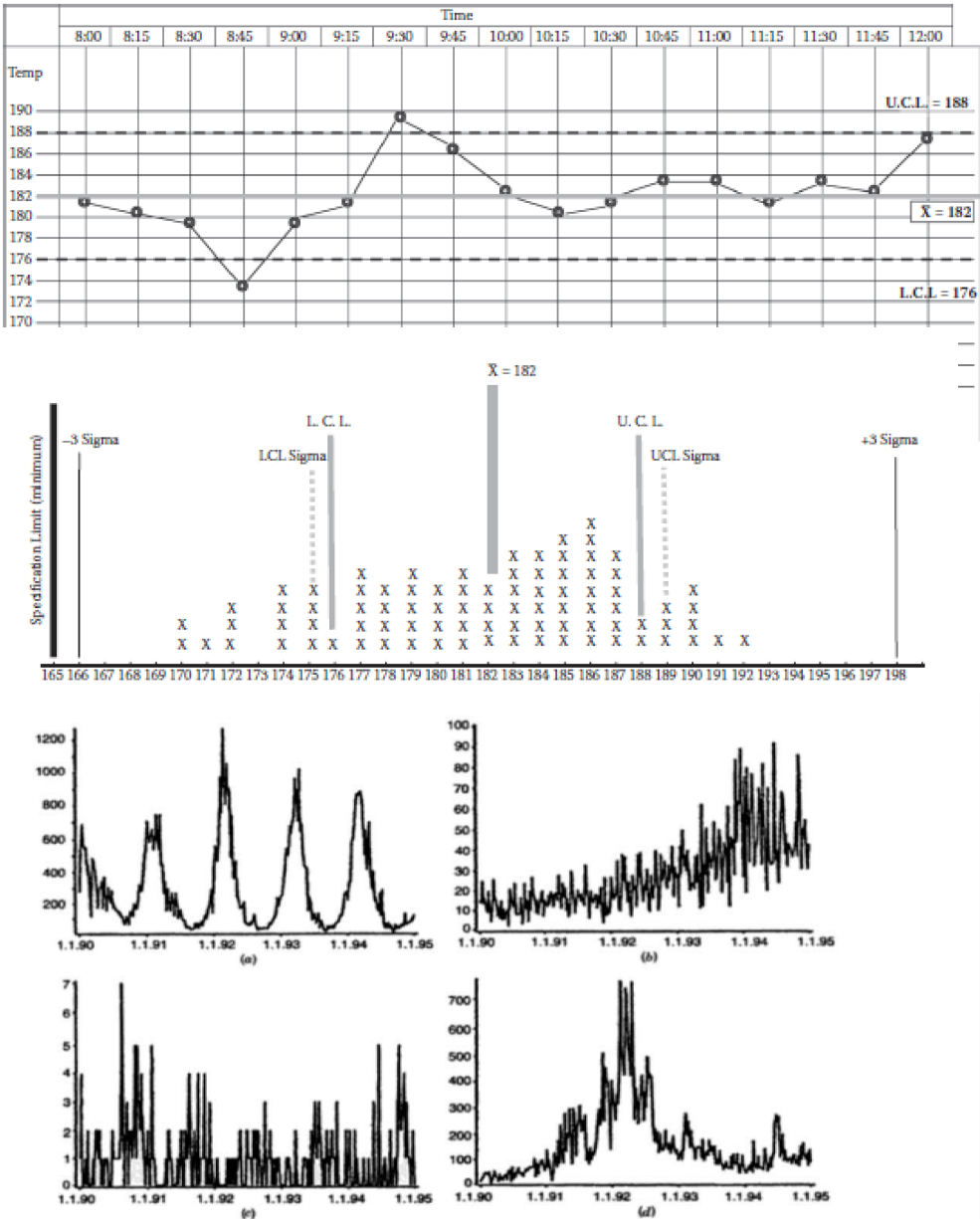
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Regardless of self-developed system or quality programs used in the industry

The processor should maintain

- Quality department and

- Comprehensive quality management manual - that includes quality assurance and quality control and other functions

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The economics of quality

Value chain

Consumer satisfaction

A company should conduct periodic audits to determine the financial, as well as other, benefits of the quality program

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Challenge to poultry industries – providing poultry originated foods in a form suitable for distribution and mass production without affecting texture, flavour, and color, is technically complex and expensive.

Best Practices Goals

- Mitigate food safety risks
- Ensure high quality products
- Meet customer specifications
- Exceed customer expectations
- Grow business

Denmark

Danpo, Aars
- Slaughterhouse (air-chilled)
- Cutting
- Fresh whole bird
- Fresh/Frozen cuttings

- 75 contracted, independent Danish chicken farmers

- Slaughter capacity 55 million chicken/year

Danpo, Farre
- Headquarter Denmark
- Value-adding processing
- Cooked, fried, battered... and much more!

- Capacity 26,000 tons/year

DK 711 EF

DK 862 EF

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