Food Safety Regulations: A Virtual Journey Across The Globe

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Master of Public Health Candidate
Food Safety and Biosecurity
Spring 2021

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Background

- Veterinary Officer
- Department of Livestock Development (DLD), Ministry of Agriculture and Cooperative (MOAC), Thailand.
- Responsible for auditing slaughterhouses, Meat processing plants for export

Background

- The midst of Covid-19 pandemic.
- *Online* Field Experience
  - Good opportunity to meet a diverse coterie of credentialed experts
- Communication via Email, Zoom, WhatsApp, and Line

Picture source: https://www.apa.org/images/article-covid-19_tcm7-277085_w1024_n.jpg

Mentors

EU expert: Dr. Lorenzo Terzi

Food microbiology laboratory expert: Dr. Valentina Trinetta

DLD: Dr. Kanyarat Saensukjaroenphon, Dr. Thiti Antarasena

KDA meat inspector: Mr. Mike Fink

KDA Laboratory officers: Sally Flowers, Sydney Orel, and Victoria Watkins

Overview

Food safety

- The absence—or safe, acceptable levels—of hazards in food that may harm the health of consumers

- Food stays safe at every stage of the food chain from production to harvest, processing, storage, distribution, all the way to preparation and consumption.

***The United Nation (FAO) definition**

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Food safety regulations

- **National Standards**: Thailand, the United States (U.S.)
- **International Standards**: WTO/SPS Agreement
  - Codex Alimentarius Commission and the World Organization for Animal Health (OIE)
- **Importing Country Standards**: the European Union (EU)

https://www.wattagnet.com/articles/29539-thai-poultry-meat-exports-set-to-grow-in-2017

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Competent Authority

- **The EU:** Directorate-General for Health and Food Safety (DG-SANTE)
- **The U.S.:**
  - Federal level: U.S. Department of Agriculture (USDA), Food Safety and Inspection Service (FSIS), Food and Drug Administration (FDA)
  - State level: Kansas Department of Agriculture (KDA)
- **Thailand:** Ministry of Public Health (MOPH),

  Department of Livestock Development (DLD), Ministry of Agriculture and Cooperative (MOAC)

European Commission
Directorate-General for Health and Food Safety (DG SANTE)

USDA FSIS

FDA

กระทรวงสาธารณสุข
MINISTRY OF PUBLIC HEALTH

AD ASTRA PER ASPERA
Kansas
Department of Agriculture

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Food Microbiology Laboratory

- Essential to identify pathogens
- Aseptic technique
- Perform effectively and efficiently

https://elements.envato.com/food-quality-assessment-in-microbiology-laboratory-6GZURSY

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Learning Objectives
Activities and portfolio products

Learning Objectives

1. To explore and summarize regulations of current importance in the Thailand-EU agri-food trade
2. To learn about Kansas food safety regulations for a wide array of protein/animal sources, and the kinds of laboratory testing involved in such regulatory activities
3. To conduct a review of the relevance of such scientific standard-setting bodies as the Codex Alimentarius Commission (Codex) and the World Organization for Animal Health (OIE) on the regulatory and trade-policy activities of Thailand

Portfolio Products

1. Portfolio product no. 1: A detailed list of recommendations for Thai producers and exporters
2. Portfolio product no. 2A: A table of food safety laws for Kansas
3. Portfolio product no. 2B: A table of selected pathogens of concern in Kansas food safety policies, and relevant lab tests
4. Portfolio product no. 3: The slide deck for guest lecture

Activities and Portfolio Products 1

1. Corresponded with my field experience mentor from the European Union to develop portfolio product no. 1: A Detailed List of Recommendations for Thai Producers

- Read and summarized EU regulations related to meat and poultry products

https://5mpublishing.strv.com/poultry%2Farticles%2Fpost-production-and-products%2Fchicken-raw-1.jpeg?scale.option=fill&scale.width=1200&scale.height=630&crop.width=1200&crop.height=630&crop.y=center&crop.x=center

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A Detailed List of Recommendations for Thai Producers and Exporters

- **Reviewed 20 regulations**

Inspection of a meat processing plant's Good Manufacturing Practice (GMP) being properly applied

Regulation no. 178/2002 (general food law, EFSA, food safety)
Regulation no. 2017/625 (official control-inspection)
Regulation no. 852/2004 (general hygiene of foodstuff-GMP)
Regulation no. 853/2004 (good hygiene, specific requirements for food of animal origin)
Regulation no. 1332/2008 (food enzyme)
Regulation no. 1333/2008 (food additives) list name in 231/2012
Regulation no. 1334/2008 (flavoring and food ingredient)

Source of photos : Department of Livestock Development

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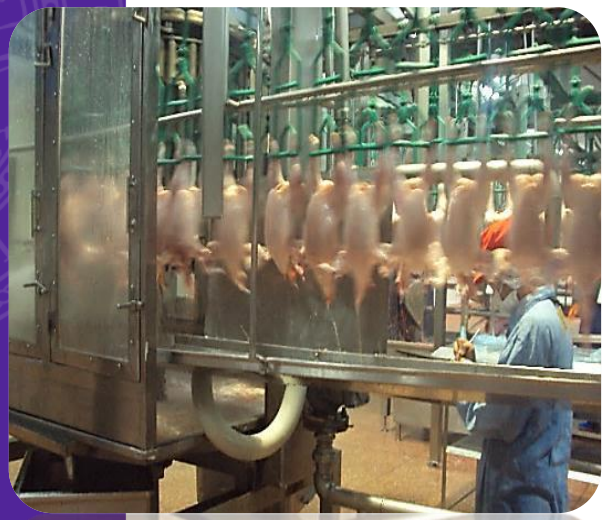
Example of Hazard Analysis & Critical Control Point (HACCP) in a poultry slaughterhouse

CCP1B
Inside-outside washing



CCP2B
Air-Chilled

CCP3P
Metal Detection (chilled Product)

CCP4P
Metal Detection (Frozen Product)

Regulation no. 852/2004 (hygiene of foodstuff-HACCP)
Regulation no. 853/2004 (internal temperature)
Council Directive no. 98/83 (water quality)

Source of photos : Department of Livestock Development

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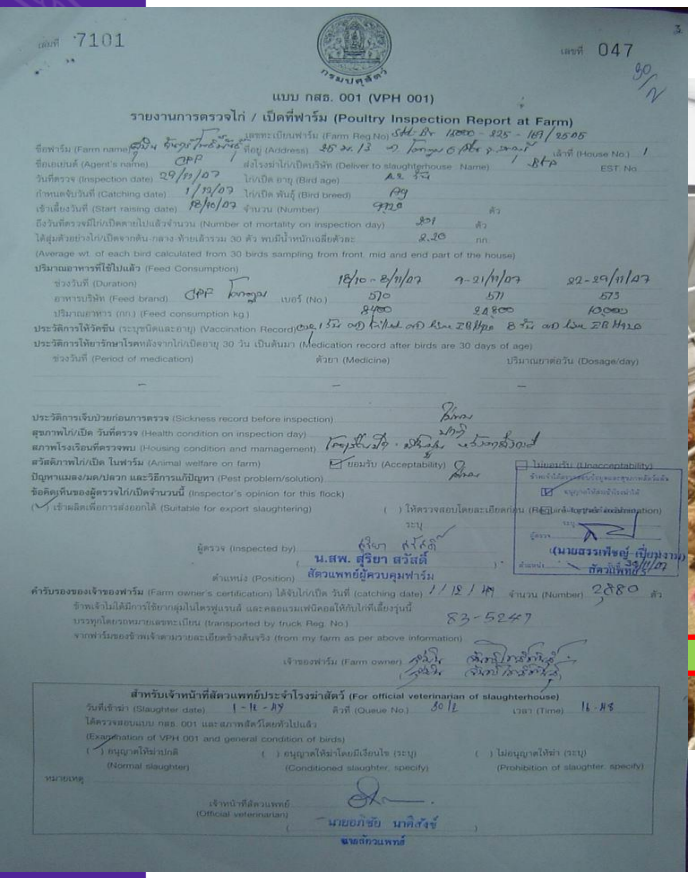
Ante-mortem inspection on a farm and at slaughterhouses


เล่มที่ 7101

เลขที่ 047

แบบ กสธ. 001 (VPH 001)

รายงานการตรวจไก่ / เป็ดที่ฟาร์ม (Poultry Inspection Report at Farm)

Regulation no. 2017/625 (official control)
Regulation no. 853/2004 (ante-mortem)
Regulation no. 1099/2009 (animal welfare at slaughterhouse)
Regulation no. 37/2010 (Veterinary drug residue)

Regulation no. 798/2008 (animal health)
Regulation no. 200/2012 (*salmonella*)
Regulation no. 2160/2003 (*Salmonella*)

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Source of photos : Department of Livestock Development

Post-mortem inspection at slaughterhouses

Regulation no. 2017/625: Official control
Regulation no. 853/2004: Post mortem
Regulation no. 2073/2005: microbiological criteria for food stuff

Source of photos : Department of Livestock Development

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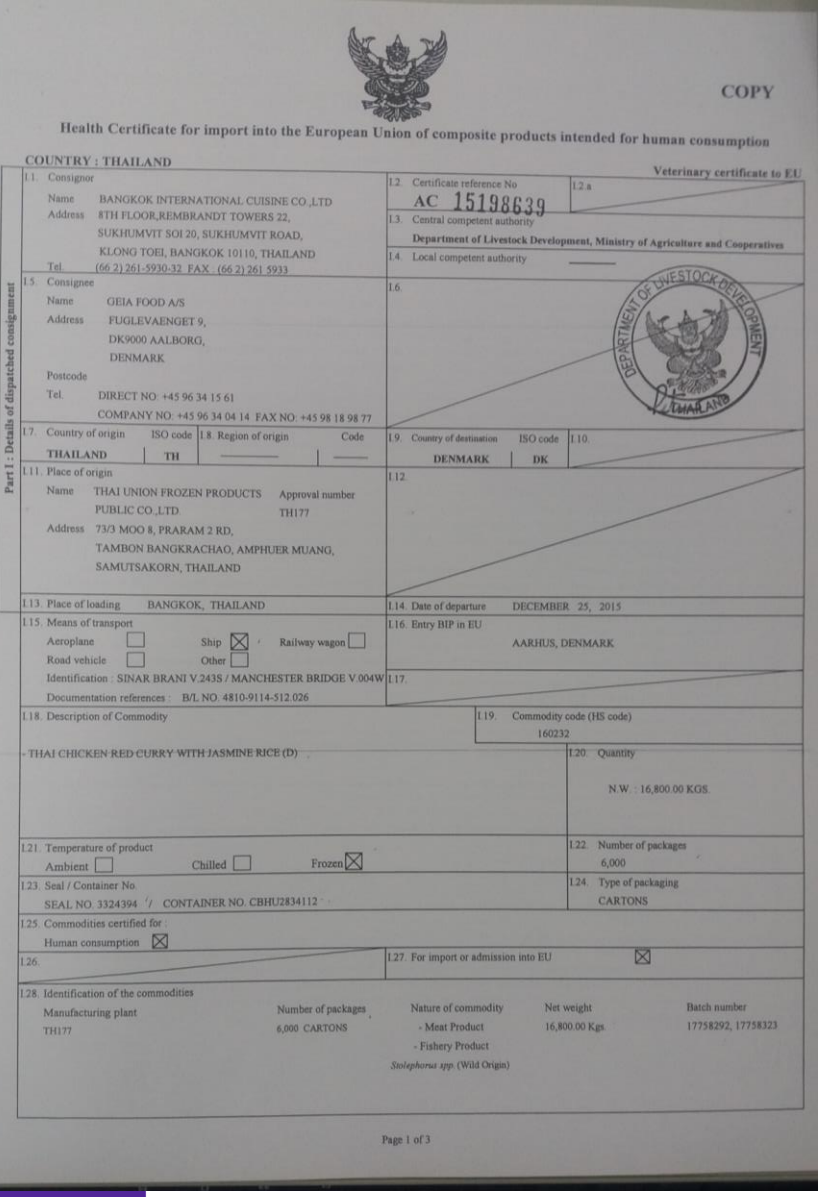
The symbol used in labelling to indicate for food contact materials

Regulation no. 1935/2004: food contact material
Regulation no. 10/2011: plastic

Health Certificate and Health Mark

TH – Thailand
EST. – Establishment number
INS P'D*P'S'D – Inspect passed



COPY

Health Certificate for import into the European Union of composite products intended for human consumption

COUNTRY : THAILAND

Veterinary certificate to EU

I.1. Consignor
Name BANGKOK INTERNATIONAL CUISINE CO.,LTD
Address 8TH FLOOR,REMBRANDT TOWERS 22, SUKHUMVIT SOI 20, SUKHUMVIT ROAD, KLONG TOEI, BANGKOK 10110, THAILAND
Tel. (66 2) 261-5930-32 FAX : (66 2) 261 5933

I.2. Certificate reference No AC 15198639
I.2.a
I.3. Central competent authority
Department of Livestock Development, Ministry of Agriculture and Cooperatives
I.4. Local competent authority

I.5. Consignee
Name GEIA FOOD A/S
Address FUGLEVAENGET 9, DK9000 AALBORG, DENMARK
Postcode
Tel. DIRECT NO: +45 96 34 15 61
COMPANY NO: +45 96 34 04 14 FAX NO: +45 98 18 98 77

I.6.

I.7. Country of origin THAILAND ISO code TH
I.8. Region of origin Code
I.9. Country of destination DENMARK ISO code DK
I.10.

I.11. Place of origin
Name THAI UNION FROZEN PRODUCTS PUBLIC CO.,LTD Approval number TH177
Address 73/3 MOO 8, PRARAM 2 RD, TAMBON BANGKRACHAO, AMPHUER MUANG, SAMUTSAKORN, THAILAND

I.12.

I.13. Place of loading BANGKOK, THAILAND
I.14. Date of departure DECEMBER 25, 2015
I.15. Means of transport
Aeroplane ☐ Ship ☒ Railway wagon ☐
Road vehicle ☐ Other ☐
Identification : SINAR BRANI V.243S / MANCHESTER BRIDGE V.004W
Documentation references : B/L NO. 4810-9114-512.026
I.16. Entry BIP in EU AARHUS, DENMARK
I.17.

I.18. Description of Commodity
- THAI CHICKEN RED CURRY WITH JASMINE RICE (D)
I.19. Commodity code (HS code) 160232
I.20. Quantity N.W. : 16,800.00 KGS.

I.21. Temperature of product
Ambient ☐ Chilled ☐ Frozen ☒
I.22. Number of packages 6,000
I.23. Seal / Container No.
SEAL NO. 3324394 / CONTAINER NO. CBHU2834112
I.24. Type of packaging CARTONS

I.25. Commodities certified for
Human consumption ☒
I.26.
I.27. For import or admission into EU ☒

I.28. Identification of the commodities

Manufacturing plant	Number of packages	Nature of commodity	Net weight	Batch number
TH177	6,000 CARTONS	- Meat Product - Fishery Product *Stolephorus spp.* (Wild Origin)	16,800.00 Kgs.	17758292, 17758323

Page 1 of 3

Part I : Details of dispatched consignment

Regulation no. 2016/429 (animal disease control in its countries)

Regulation no. 2017/625 (official control)
Regulation no. 853/2004 (identification mark)
Regulation no. 2160/2003 (Salmonella)
Regulation no. 1169/2011, and 16/2012 (food labelling)

Source of photos : Department of Livestock Development

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EU website indicating third-country establishments qualified to export

webgate.ec.europa.eu/sanco/traces/output/non_eu_listsPerActivity_en.htm#

Apps | Crit care med give... | Emergency Medicin... | กล่องจดหมาย (28) | Rosselkhoznadzor -... | dld-portal | Dashboard |

Third Country Establishments
List per Section

Food

- Section I : Meat of domestic ungulates
- Section II : Meat from poultry and lagomorphs
- Section III : Meat of farmed game
- Section IV : Wild game meat
- Section V : Minced meat, meat preparations and mechanically separated meat (MSM)
- Section VI : Meat products
- Section VII : Live bivalve molluscs
- Section VIII : Fishery products
- Section IX : raw milk, dairy products, colostrum and colostrum-based products
- Section X : Eggs and egg products

Introduction

Please click on an activity located on the le

https://webgate.ec.europa.eu/sanco/traces/output/non_eu_listsPerActivity_en.htm

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Activities and Portfolio Products 2A

2. Corresponded with the mentor who is an inspector for the State of Kansas.

- Learned about and explored KDA and USDA regulatory documents.
- Created portfolio product no. 2A: A Table of Food Safety Laws for Kansas

https://archivesocial.com/social-media-records/kansas/

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A Table of Food Safety Laws for Kansas

- Nine food safety laws and standards
- Summarized focus points in the documents and provided additional comments

Snapshot of part of
A Table of Food Safety Laws for Kansas

Laws, regulations, and guidance	Focus	Additional comment
Kansas Meat and Poultry Inspection Act (KMPIA)	This law's requirements are for meat and poultry slaughterhouses and meat production plants. This law mainly mentions the related activities in slaughterhouses such as • Meat inspection, • Sanitation, • Labeling, • Inspection fee, • Official mark, • Health certificate, and • Food advertising and sale practice	The KDA staff and inspectors should understand the rules in the law because they have to apply it to the food plants. Food business operators should also understand and follow the requirements mentioned in this law.

Snapshot of part of
A Table of Food Safety Laws for Kansas

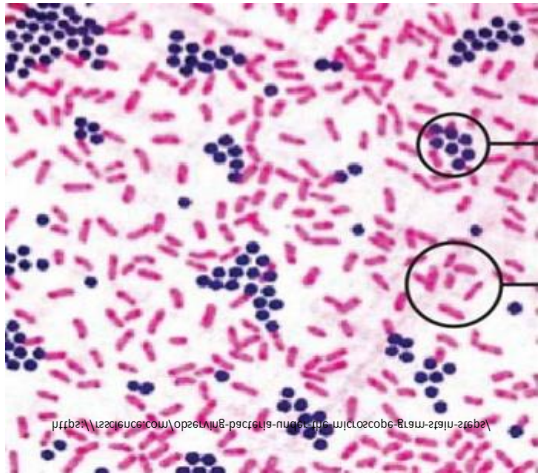
Laws, regulations, and guidance	Focus	Additional comment
Mobile Slaughter Unit Compliance Guide	This guidance document helps the owners and managers of red meat or poultry mobile slaughter units to "come under" the Federal system of inspection, understand and follow the Food Safety and Inspection Service (FSIS) requirements (e.g., a grant of inspection, sanitation requirements, Sanitation Standard Operating Procedures –SSOPs, Hazard Analysis and Critical Control Point-HACCP, and other slaughter regulatory concerns)	This guidance helps to clarify the requirements under laws or agency policies to the public. The contents in this guidance do not have enforcement effect.

Activities and Portfolio Products 2B

3. Developed portfolio product no. 2B: A Table of Selected Pathogens of Concern in Kansas Food Safety Policies, and Relevant Lab Tests.

- Selected important pathogens
  - *Salmonella* spp., *E. coli O157:H7*, *Campylobacter jejuni/coli/lari*, *Clostridium perfringen*, *Listeria monocytogenes*, *Norovirus*, *Toxoplasma gondii* and Aflatoxin.
- Learned and summarized laboratory procedures from Dr. Trinetta and the KDA Laboratory officers

Activities for portfolio product 2B:
A Table of Selected Pathogens of Concern in Kansas Food Safety Policies, and Relevant Lab Tests.



Laboratory methods

- Gram staining
- Traditional Microbial Enumeration Methods: Standard Plate Count
- Culture methods: using selective media, nutrient media
- Biochemical tests: TSI, API
- Serologic tests: Agglutination test, Enzyme-Linked Immunosorbent Assay (ELISA)
- Genetic tests: Polymerase Chain Reaction (PCR), Whole Genome Sequencing (WGS)

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A Table of Selected Pathogens of Concern in Kansas food safety policies, and relevant lab tests

Pathogen	Relevant lab tests
Salmonella spp. (KMPIA)	**Generally recognized tests:** Standard Plate Count, Gram staining, Bacterial culture using selective and differential media (HE, BS, XLD agar, TT broth, and RV broth), Biochemical tests (TSI and LIA), Serologic tests (e.g., Agglutination test), Genetic tests (PCR, WGS) **USDA FSIS-Microbiology Laboratory Guidebook (MLG):** 1. Rapid Screening Salmonella Test Procedures using the current 3M™ Molecular Detection, 2. Selective enrichment and plating media using TT broth, RV broth, BGS agar, and DMLIA agar 3. Examination of and picking colonies from plating media Screening media using TSI and LIA slants, molecular serotyping or whole genome sequencing may be performed 4. Biochemical procedures using commercially biochemical test kit (i.e. *VITEK 2® Compact System) or traditional methods of biochemical identification (i.e. AOAC Official Method 967.27)*

MLG webpage: https://www.fsis.usda.gov/news-events/publications/microbiology-laboratory-guidebook

A Table of Selected Pathogens of Concern in Kansas food safety policies, and relevant lab tests

Pathogen	Relevant lab tests
Listeria monocytogenes	**Generally recognized tests**: 1. Sample preparation and primary enrichment by mixing 10 g of food with UVM broth 2. Secondary enrichment using Fraser Broth (FB) 3. Differential plating using MOX agar 4. Selecting typical colony from MOX agar onto biochemical tests (API *Listeria* test) **USDA FSIS-Microbiology Laboratory Guidebook (MLG):** 1. Detection and isolation procedures: Sample preparation, Primary enrichment in UVM broth, Secondary enrichment in MOPS-BLEB and direct MOX plating of UVM, Rapid screening of *L. monocytogenes* using the current 3M™ Molecular Detection , Examination of direct MOX and MOX plating of MOPS-BLEB by transferring the suspect colony from MOX to HL agar, Isolation and purification procedures by finding the Beta-hemolytic colonies on HL agar 2. Confirmation and Identification procedures Inoculation of preliminary confirmation test by picking one typical isolated colony from HL/ agar to streak onto TSA-SB agar Biochemical tests using *VITEK 2® Compact System* *Genetic identification tests using ribosomal RNA-Based tests*

MLG webpage: https://www.fsis.usda.gov/news-events/publications/microbiology-laboratory-guidebook

Activities and Portfolio Products 3

4. Created portfolio products no.3: the slide deck for guest lecture on the topic of “The relevance of the Codex Alimentarius Commission (Codex) and the World Organization for Animal Health (OIE) for Thailand’s poultry export trade”

- Corresponded with the mentor from DLD
- Reviewed some Codex Alimentarius Commission (Codex) and the World Organization for Animal Health (OIE) standards

CODEX ALIMENTARIUS

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

World Health Organization

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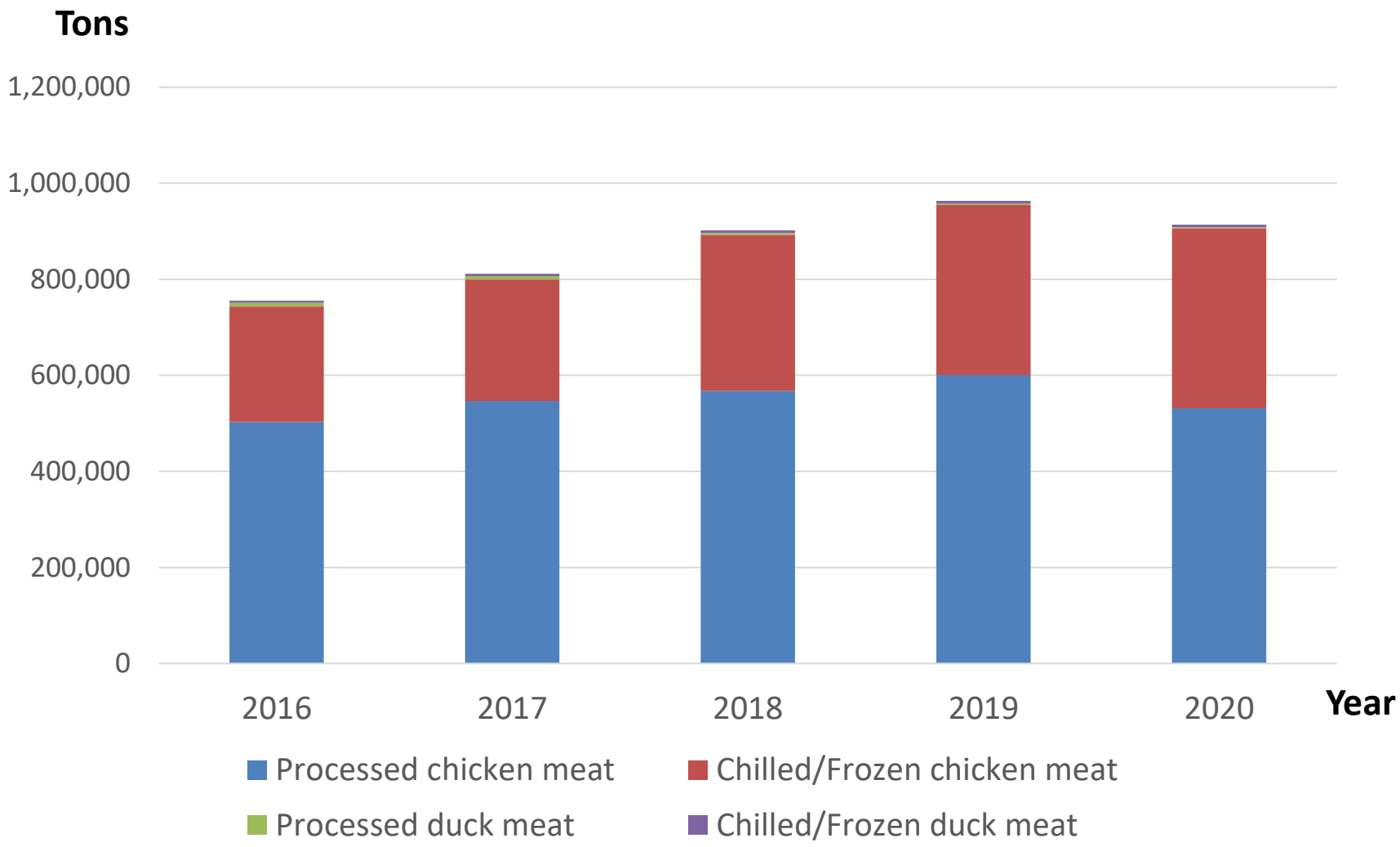
Topics addressed in guest lecture on Codex and OIE standards in Thailand's poultry trade

- General information about Thailand
- Background on the importance of the poultry trade to Thailand’s economy
- Thailand’s exported poultry products from 2016 to 2020
- Thailand’s Competent Authority in the poultry sector
- Poultry Production in Thailand
- National regulations/standards for the poultry sector in Thailand
- Codex Alimentarius
- Codex standards that are important for Thailand’s poultry sector
- CAC General Principles of Food Hygiene
- Other Codex standards for the poultry sector
- World Organization for Animal Health (OIE)
- OIE standards that are important for Thailand’s poultry sector
- Components of a Notifiable Avian Influenza (NAI) - Free Compartment

Examples from slide deck

Thailand's exported poultry products from 2016 to 2020



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Codex and OIE standards in Thailand's poultry trade

- Code of Practice General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4: 2003)
- Code of Hygiene Practice for Meat (CAC/RCP 58-2005)

Good Manufacturing Practice (GMP)
Hazard Analysis and Critical Control Point (HACCP)

- Guide to good farming practices for animal production food safety
- Animal Welfare and Broiler Production System from OIE, Terrestrial Animal Health Code. Chapter 7.10
- Zoning and compartmentalization

Good Agricultural Practice (GAP)
Animal Welfare
Compartmentalization

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Reflection, Analysis, and Key Observations

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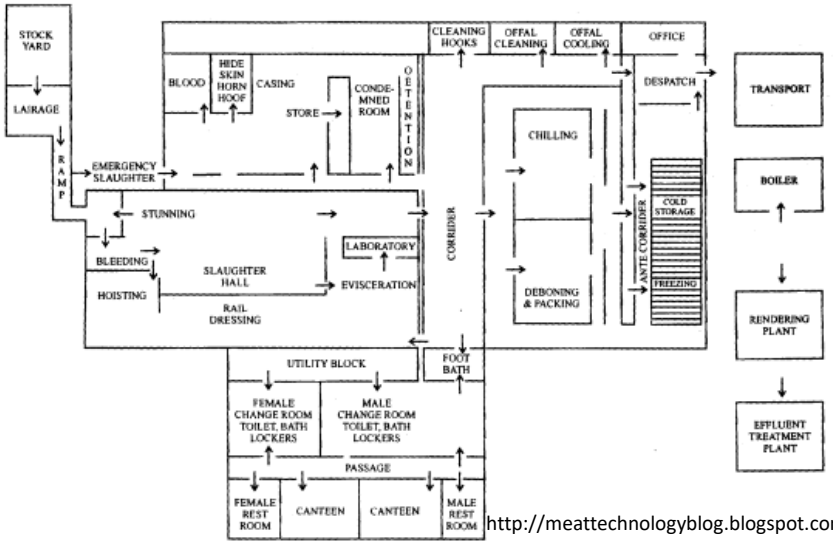
Reflection, Analysis, and Key Observations

1. General requirements required before KDA inspects facilities
2. The interesting case of *Staphylococcus aureus* and its absence in KDA inspection protocols
3. The unique challenge and opportunity of Thailand's compliance with EU regulatory requirements
4. Compartmentalization in Thailand: A story of complex implementation
5. The EU's microbiological criteria for raw milk
6. A selected EU regulation of interest
7. Career development learning from mentors

1. General requirements required before KDA inspects facilities

- New facilities will be approved by the field supervisor and the field inspection supervisor
- Establishment numbers are system-generated.
- General requirements include blue printed of plants layout, application for grant inspection and payment, office for inspector, pest control plan, approved sanitation program, a list of approved cleaning and sanitizing compounds, establishing fix hour of operation, and etc.



http://meattechnologyblog.blogspot.com/2013/12/plant-layout-and-design.html

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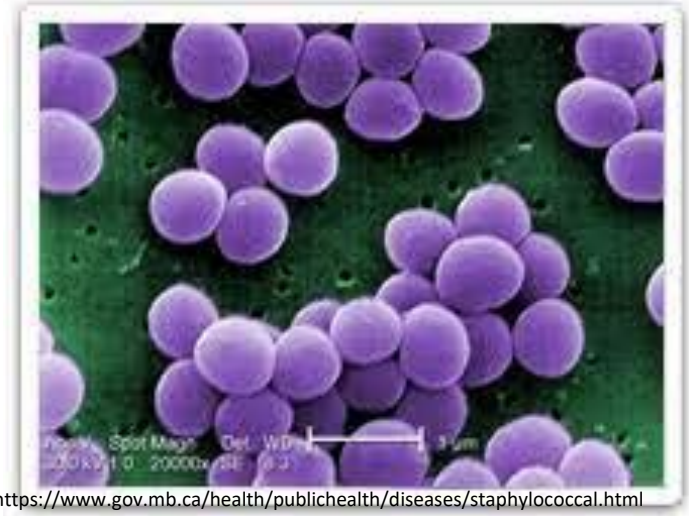
The Kansas Inspection Legend

- 28 meat and poultry slaughterhouses and processing plants under KDA inspection

Source of photo: https://agriculture.ks.gov/divisions-programs/meat-and-poultry-inspection

2. The interesting case of *Staphylococcus aureus* and its absence in KDA inspection protocols

- *Staphylococcus aureus*
  - gram-positive, cocci, facultative anaerobe, non-motile, non-spore forming bacteria.
  - Found in nasal passages and on human skin
  - Produce heat-stable enterotoxin
  - Nausea, vomiting, and stomach cramps



https://www.gov.mb.ca/health/publichealth/diseases/staphylococcal.html

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2. The interesting case of *Staphylococcus aureus* and its absence in KDA inspection protocols

- No routine screening test for *S. aureus* (KDA)
- No specific regulatory requirements for RTE foods to control *S. aureus* (FSIS)
- Performing enterotoxin tests only during outbreaks (CDC)
- Possible reasons why it is not in routine test
  - Less outbreaks occur
  - The symptoms can subside within a day
  - Rare severe cases

https://apkpure.com/staphylococcal-food-poisoning-infection-help/com.OneLife2Care.StaphylococcalFoodPoisoningHelp

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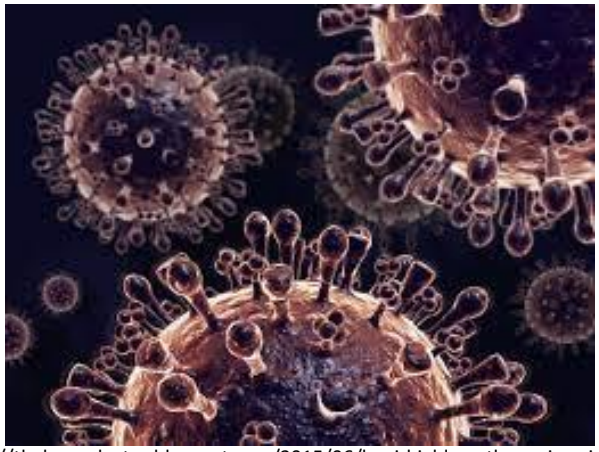
3. The unique challenge and opportunity of Thailand's compliance with EU regulatory requirements

- High Pathogenic Avian Influenza (HPAI)outbreaks in 2004
- 17 human deaths (2004 to 2006)
- 62 million birds deaths (killed by HPAI viruses or culled)
- Damaged Thailand's poultry industry
- The European Union (EU) prohibited the import of poultry products from Thailand on January 23, 2004



http://thehorsedoctor.blogspot.com/2015/06/hpai-highly-pathogenic-avian-influenza.html

https://www.thepoultrysite.com/articles/weekly-poultry-digest-bird-flu-outbreaks-continue-in-europe

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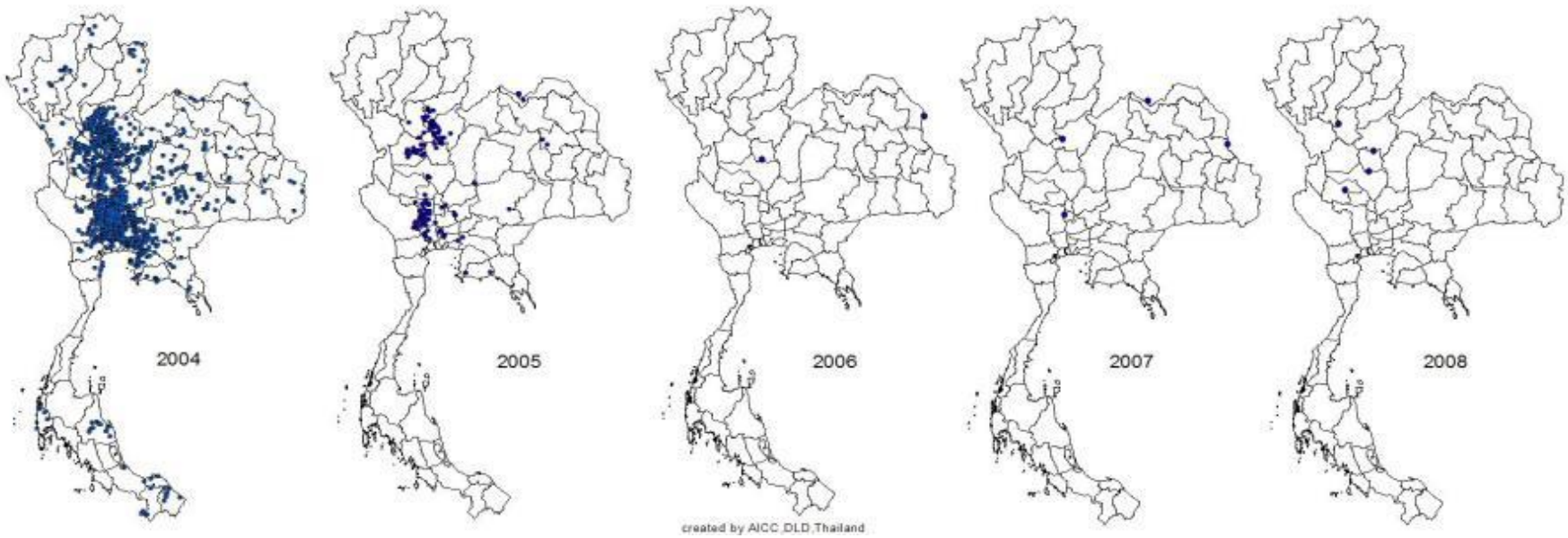
3. The unique challenge and opportunity of Thailand's compliance with EU regulatory requirements



- Implementing compartmentalization
- Collaboration between government and producers (DLD, MOPH, farmers, and producers)
- The EU allowed country members to import raw poultry meat products from Thailand again since July 1, 2012.

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4. Compartmentalization in Thailand: A story of complex implementation

- The OIE introduced zoning and compartmentalization concepts in 2005
- Thailand adopted the OIE compartmentalization concepts in 2006 *only* for broiler and meat-type duck establishments to be the Notifiable Avian Influenza (NAI)-free compartment
- In 2011, the DLD certified a compartment for breeder poultry, hatcheries, poultry feed mills, and poultry slaughterhouses

*Notifiable Avian Influenza (NAI) includes two particular subtypes, H5 and H7 that must be reported to the OIE

https://www.ncagr.gov/NCPrep/EducationalContent.htm

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Components of a NAI-Free Compartment

Biosecurity management standards for Farm and Hatchery:

- General condition of farm
- Farm management
- Feed management
- Personnel management
- Poultry health management
- Pest control
- Water supply
- Environmental management
- Traceability system
- Biosecurity management in emergency response

Source of photos : Department of Livestock Development

5. The EU's microbiological criteria for raw milk

- Found in the Regulation (EC) No 853/2004, annex III, section IX: Raw milk and Dairy Products
- Criteria for raw cows' milk:
  - Plate count at 30°C ≤ 100,000 cfu/ml,
  - Somatic cell count ≤ 400,000 cells per ml
- Criteria for raw milk from other species:
  - Plate count at 30°C ≤ 1,500,000 cfu/ml, but for use with no heat treatment: Plate count at 30 °C ≤ 500,000 cfu/ml

Milk powder from 14,000 cows

Source of photo: https://www.youtube.com/watch?v=0SvuKc64DRo

5. The EU's microbiological criteria for raw milk

- Controversial (in both the U.S. and EU): raw milk intended for human consumption!
- Raw milk should be pasteurized before consumption.

https://assets.tvo.org/prod/s3fs-public/styles/full_width_1280/public/article-thumbnails/RAW%20MILK2.jpg?L1qRnrLVoh_5UCKTiB0XQoeNjZoFHUyr

6. A selected EU regulation of interest

- Visited Fiorital Company, Venice, Italy
- The safety of fishery products (Regulation no. 853/2004 Annex III, Section VIII)

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7. Career development learning from mentors

- Inspirational
- Kind
- Knowledgeable
- Supportive

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7. Career development learning from mentors

Source of photo: https://www.instagram.com/trinettalab/
https://foodsci.k-state.edu/
https://agriculture.ks.gov/

Master of Public Health (MPH) Foundational Competencies

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MPH Foundational Competencies

Number and Competency		Description (APE activity and/or product)
5	Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings	Portfolio product no. 1 Portfolio product no. 2A and 2B Portfolio product no. 3
16	Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making	Portfolio product no. 1
18	Select communication strategies for different audiences and sectors	Portfolio product no. 1 and 3
19	Communicate audience-appropriate public health content, both in writing and through oral presentation	Portfolio product no. 1 and 3
21	Perform effectively on interprofessional teams	Communicated with all mentors to produce all portfolio products

1. Portfolio product no. 1: A detailed list of recommendations for Thai producers and exporters
2. Portfolio product no. 2A: A table of food safety laws for Kansas
3. Portfolio product no. 2B: A table of selected pathogens of concern in Kansas food safety policies, and relevant lab tests
4. Portfolio product no. 3: The slide deck for guest lecture

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For Food Safety and Biosecurity emphasis area competencies, see my reports

1. Food safety and biosecurity
2. Threats to the food system
3. Food safety laws and regulations
4. Food safety policy and the global food system
5. Multidisciplinary leadership

Acknowledgements

- **Mentors**
  - EU: Dr. Lorenzo Terzi
  - DLD: Dr. Kanyarat Saensukjaroenphon, Dr. Thiti Antarasena
  - KDA: Mr. Mike Fink
  - KDA Laboratory: Sally Flowers, Sydney Orel, and Victoria Watkins
  - Food microbiology laboratory expert: Dr. Valentina Trinetta
- **MPH committee**
  - Dr. Abbey Nutsch
  - Dr. Valentina Trinetta
- **MPH office**
  - Dr. Ellyn Mulcahy
  - Barta Stevenson
- **Major advisor, MPH committee, and Preceptor**
  - Dr. Justin Kastner
- **Thai government** (the DLD and the Royal Thai Government Scholarship)
- **My family and friends**

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Thank you for your attention

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