มหาวิทยาลัยเกษตรศาสตร์
KASETSART UNIVERSITY

Food Safety Management for Fresh Produce

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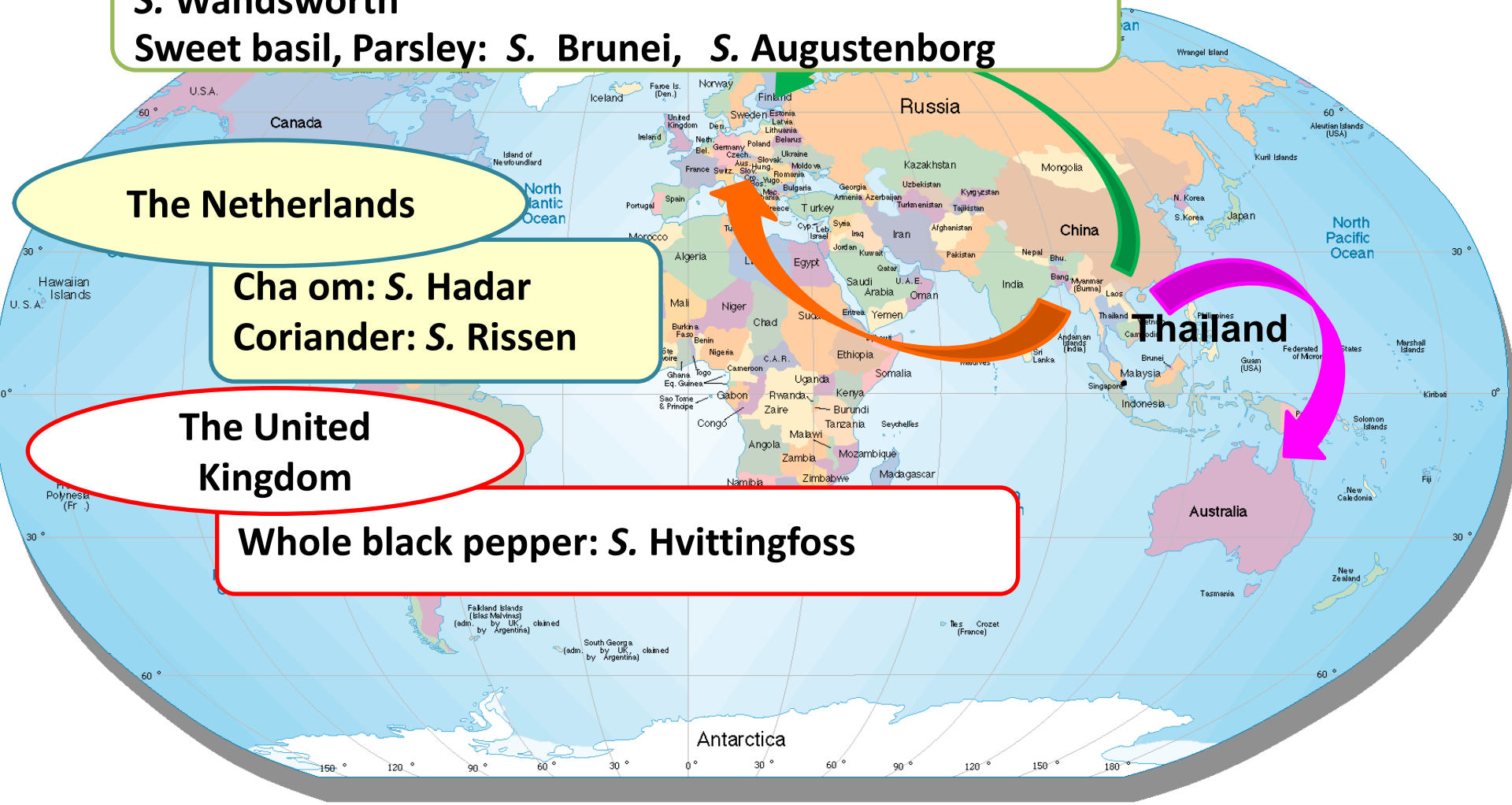
Finland

Fresh leaf vegetable: *S.* Ndolo, *S.* Bovismorbificans, *S.* Wandsworth
Sweet basil, Parsley: *S.* Brunei, *S.* Augustenborg



The Netherlands

Cha om: *S.* Hadar
Coriander: *S.* Rissen

The United Kingdom

Whole black pepper: *S.* Hvittingfoss

เอกสารประกอบ : รายการสารตกค้างในสินค้าเกษตร-อาหารที่ EU ตรวจพบ

เดือนกุมภาพันธ์ 2552

(ข้อมูลจาก ALERT NOTIFICATION)

รายการ	วันที่	ประเทศที่แจ้งพบสารตกค้าง	รายการสารตกค้าง	สินค้านำเข้าจากประเทศ
1	2/02/2009	Netherlands	Salmonella in Asiatic pennywort	Thailand
2	2/02/2009	Poland	Salmonella in soybean meal	Argentina
3	2/02/2009	Italy	carbon monoxide treatment of frozen slices of swordfish	Netherlands
4	2/02/2009	Netherlands	Salmonella in praew leaf	Thailand
14	4/02/2009	Finland	carbofuran, prophenophos, ethion, triazophos , omethoate and dimethoate in fresh coriander	Thailand
15	4/02/2009	Italy	presence of bacterial inhibitor (penicillin group) in pasteurized milk	Austria
16	4/02/2009	Germany	unauthorised placing on the market of herbal infusion containing Senna leaves	Vietnam
17	4/02/2009	Italy	imazalil in lemons	Argentina
18	5/02/2009	Malta	high number of aerobic plate counts in purified drinking water	Malta
19	5/02/2009	Spain	aflatoxins in roasted pistachios	Spain
20	5/02/2009	Norway	unauthorised placing on the market of flavoured green tea containing Senna and Garcinia (Sennae folium, Sennae fructus and Garcinia atroviridis)	Thailand
21	5/02/2009	Germany	aluminium in instant noodles	China
22	5/02/2009	Norway	unauthorised placing on the market of herbal infusion containing Senna (Sennae folium and Sennae fructus)	Thailand

Why does fresh produce become the culprit ?

- Advances in agronomic, processing, preservation, packaging, shipping and marketing technologies enable to supply consumer a wide range of high-quality produce year round.

- The use of manure rather than chemical fertilizers, as well as the use of untreated sewage or irrigation water.

Why does fresh produce become the culprit ?

- Changes in the produce industry, social demographics, food consumption patterns and the awareness of fresh fruits and vegetables are potential vehicles of infection.

- The contribution of epidemiology of disease.

- Increase of importation, knowledge of the presence and numbers of specific pathogens in imported produce.

- The distribution of goods throughout the country.

Foodborne pathogens associated with fresh produce

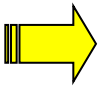
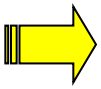
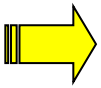
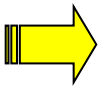
- Numerous microorganism, most of them from enteric environment have been isolated from a variety of fresh fruit and vegetables.

- *Salmonella spp., E. coli O157:H7, C. jejuni*

- But also some of which from other sources.

- *Cl. botulinum* and *L. monocytogenes*

Microorganism associated with produce-borne outbreaks

Listeria monocytogenes ***Clostridium botulinum*** ***Bacillus cereus***		**Naturally present in some soil, animal feces used as fertilizer, some packing type**
***Salmonella* spp.** ***Escherichia coli* O157:H7**		**Inadequately decomposed manure, cross-contamination**
Campylobacter jejuni ***Vibrio cholerae***		**Irrigation water containing untreated sewage, cross contamination**
Parasites **Viruses**		**Contaminated wash water, human handling**

Microorganisms	Infection Dose (Number of Cells)	Source
Bacteria		
Clostridium botulinum	Intoxication (growth and toxin production in food)	Soils,lakes, streams, decaying vegetation reptiles.
Escherichia coli O157:H7	10 to 1000	Animal feces (cattle, deer etc.), human feces, cross contamination from raw meat.
Salmonella	10 to 100,000	Animal feces (cattle, deer etc.), human feces, cross contamination from raw meat.

Microorganisms	Infection Dose (Number of Cells)	Source
Bacteria		
Shigella spp.	**~ 10**	**Human feces.**
Listeria monocytogenes	**Unknown dependent upon health of individual**	**Soil, food processing environment.**

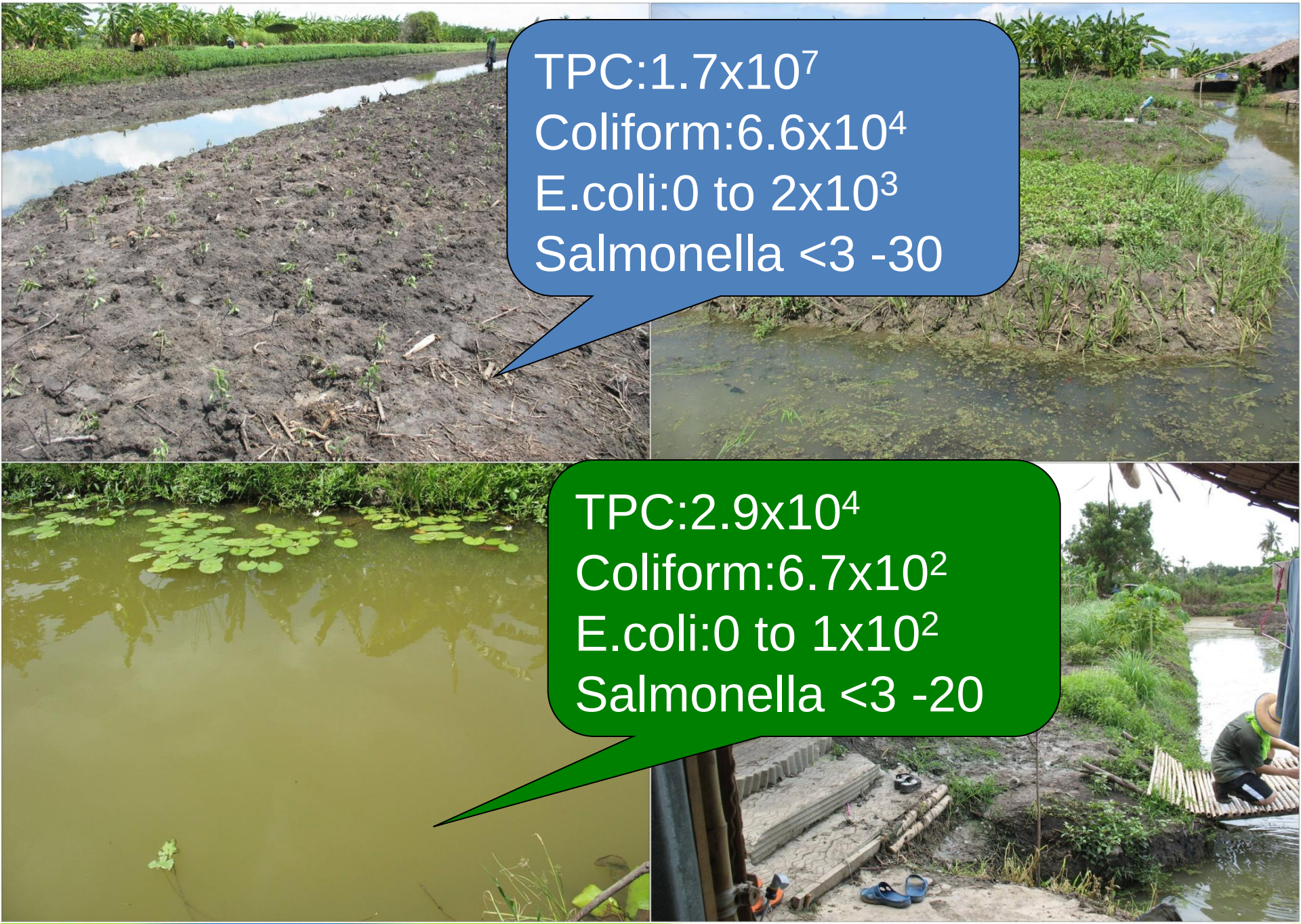
Microorganisms	Infection Dose (Number of Cells)	Source
Protozoa		
Cryptosporidium spp.	~ 30	Animal and human feces.
Cyclospora spp.	Unknown probably low	Unknown

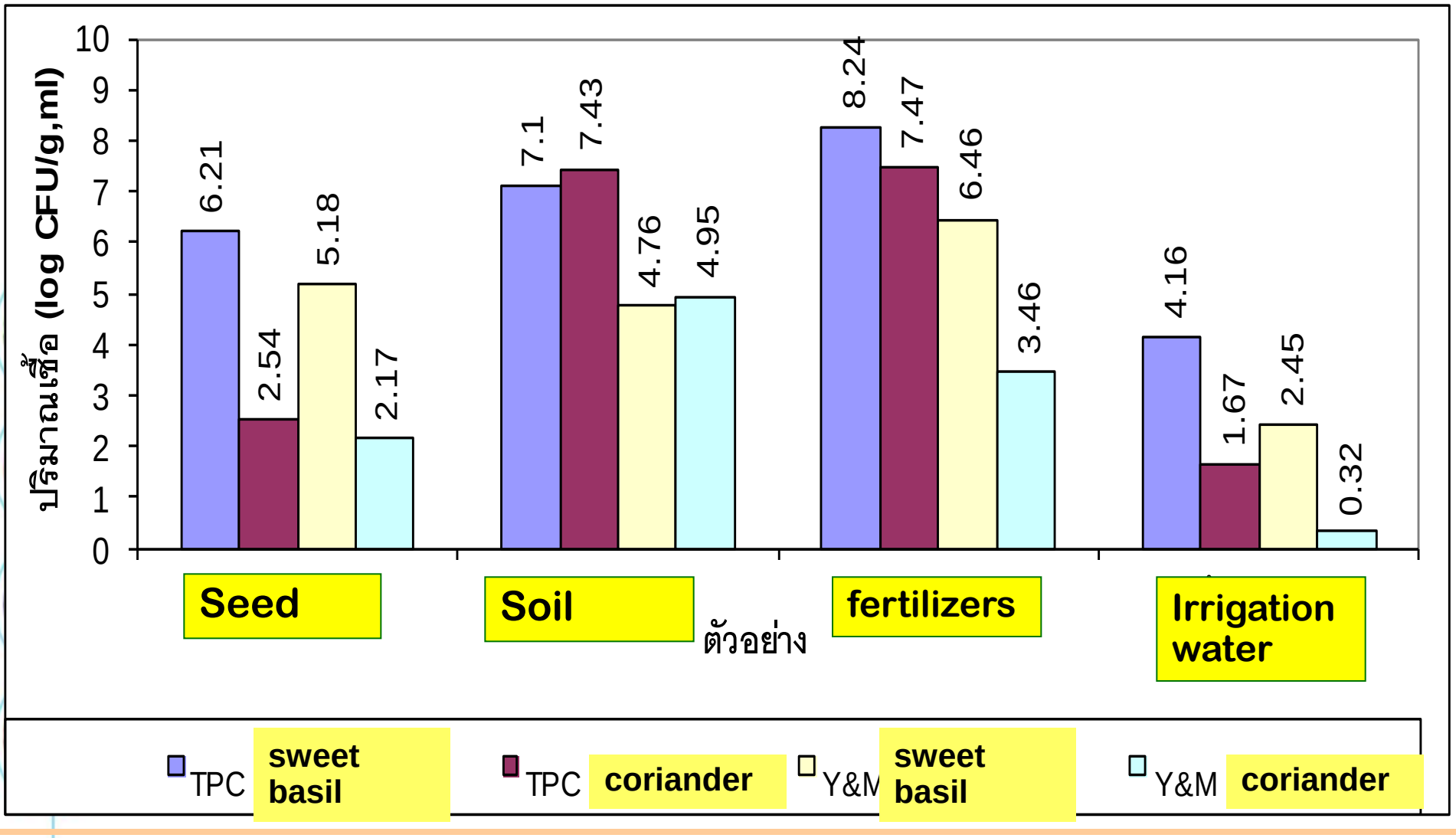
Microorganisms	Infection Dose (Number of Cells)	Source
Viruses		
Hepatitis A	10 to 50	Human feces and urine.
Norwalk/ Norwalk like virus	Unknown probably low	Human feces, vo mitus.

Source of contamination

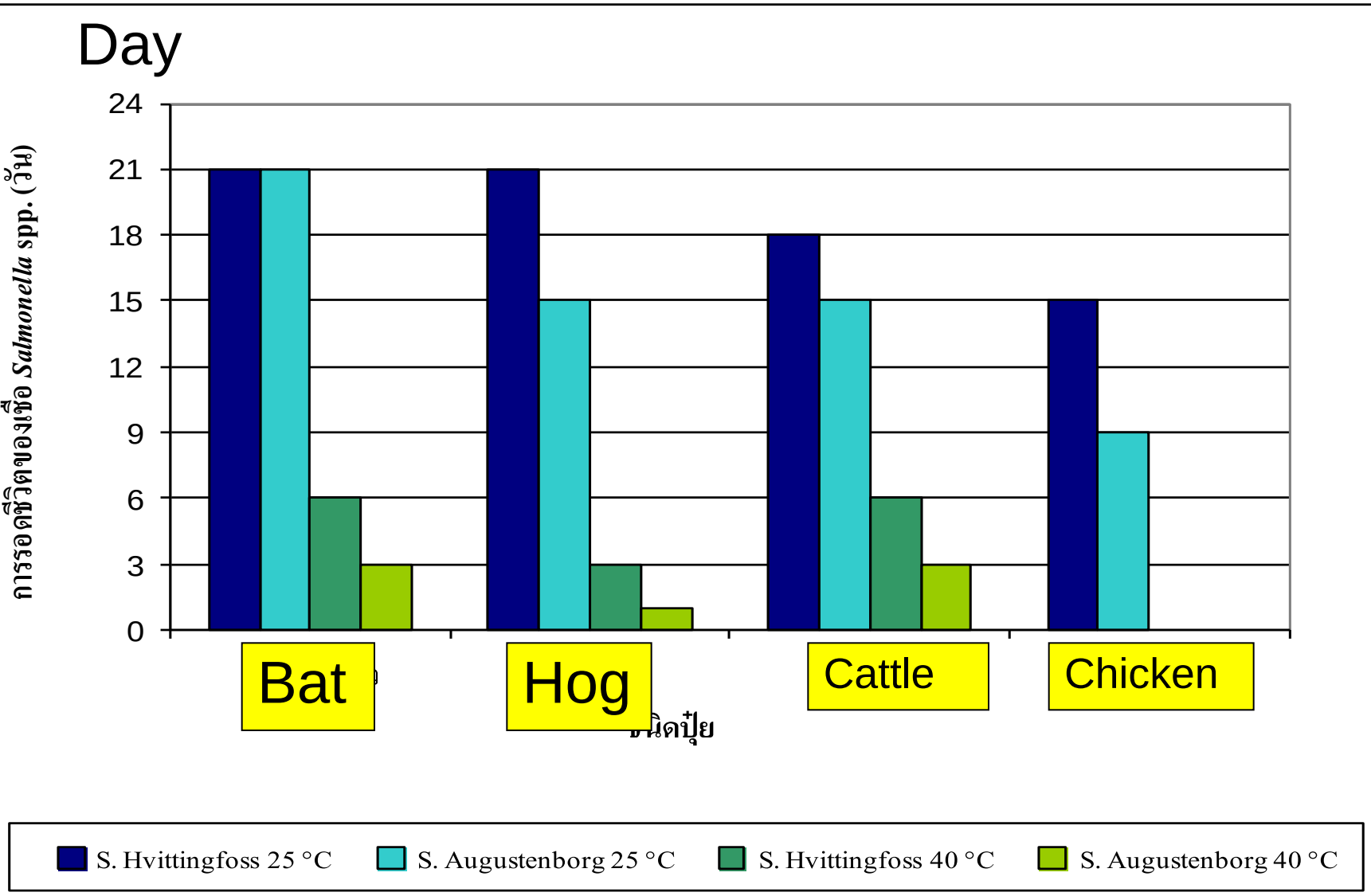
Pre-harvest:

- Soil
- Irrigation water
- Inadequately composted manure
- Air (dust)
- Wild and domestic animals
- Human handling
- Water for other uses (apply fungicides, insecticides, growth hormone etc.)


TPC:1.7x10^{7}
Coliform:6.6x10^{4}
E.coli:0 to 2x10^{3}
Salmonella <3 -30
TPC:2.9x10^{4}
Coliform:6.7x10^{2}
E.coli:0 to 1x10^{2}
Salmonella <3 -20



Total aerobic count and total yeast and mold found in environment of sweet basil and coriander plant production



Survival of *S.* Augustenborg and *S.* Hvittingfoss in dried animal fetilizers during Storage at 25C and 40C

Wild birds are known to disseminate *Campylobacter*, *Salmonella*, *V. cholerae*, *Listeria* spp., *E. coli* O157:H7.

Pre-harvest : Sources of Contamination

-Application of feces or untreated sewage may result in the presence of pathogenic bacteria, viruses and parasite in soil.

- Soil on the surface of fruits and vegetables may harbor viable pathogenic microorganism, subsequent effective sanitizing procedure need to be administered.

- Irrigation and surface run-off waters can be the source of pathogenic microorganism.

- Contact of fruit and vegetable by pickers and handlers a the time of harvest offered a pathogen in feces contaminated on produce.

Source of contamination (Cont.)

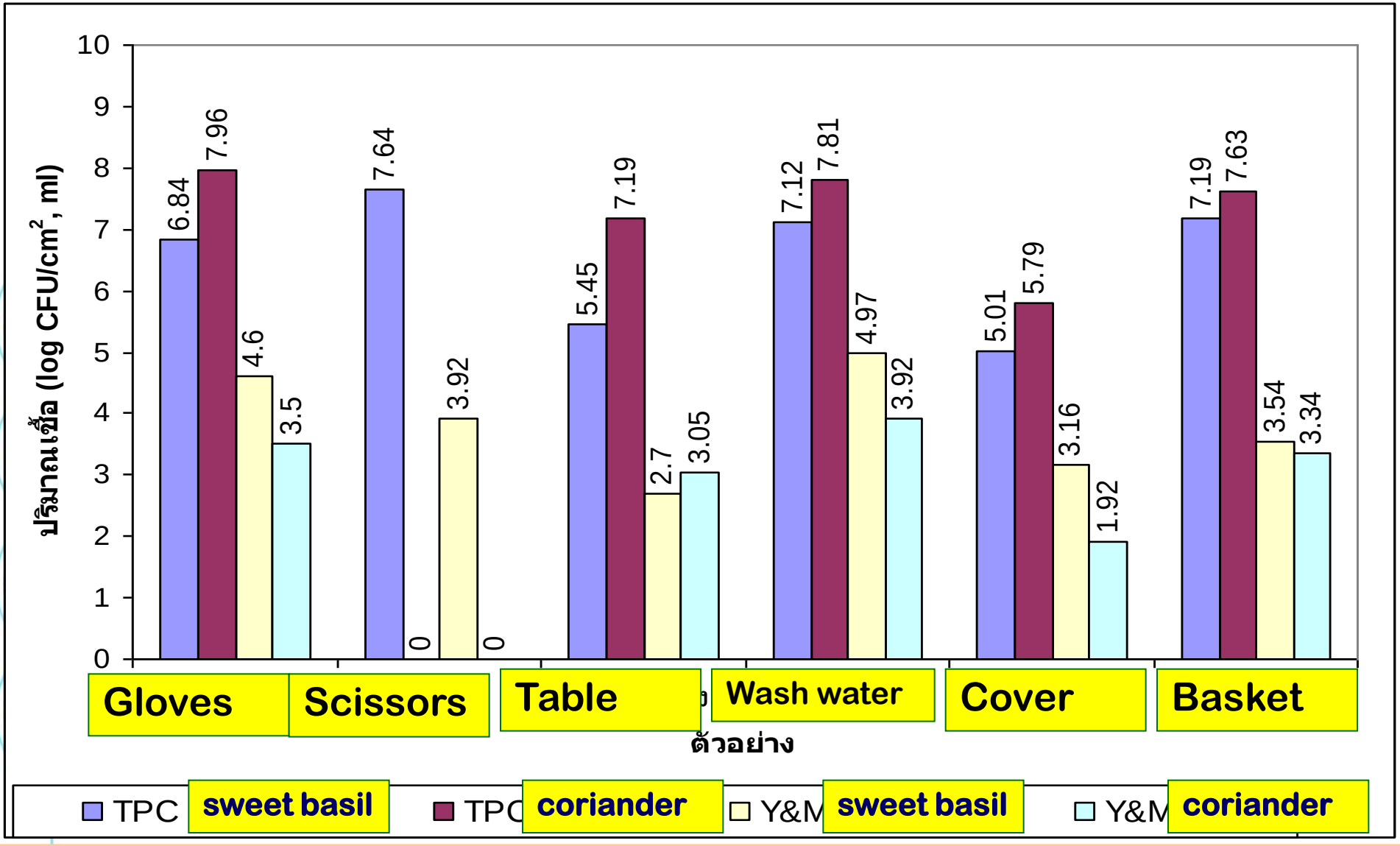
Post-harvest:

- Human handling (worker, consumers)
- Harvesting equipment
- Transport containers (field to packing sheds)
- Wild and domestic animals (including fowl and reptiles)
- Air (dust)
- Wash and rinse water
- Sorting, packing, cutting and further process equipment
- Ice
- Transport vehicles
- Improper storage
- Cross-contamination
- Improper display temperature
- Improper handling after wholesale or retail purchase
- Cooling water

Wash water from washing process at collecting house

Washed basket

Ready to transport to factory



Total aerobic count and total yeast and mold found in environment of preparation of sweet basil and coriander at collecting house

Post-harvest : Sources of Contamination

-Workers handling fruits and vegetables. Human and animals can shed foodborne pathogen in the absence of illness

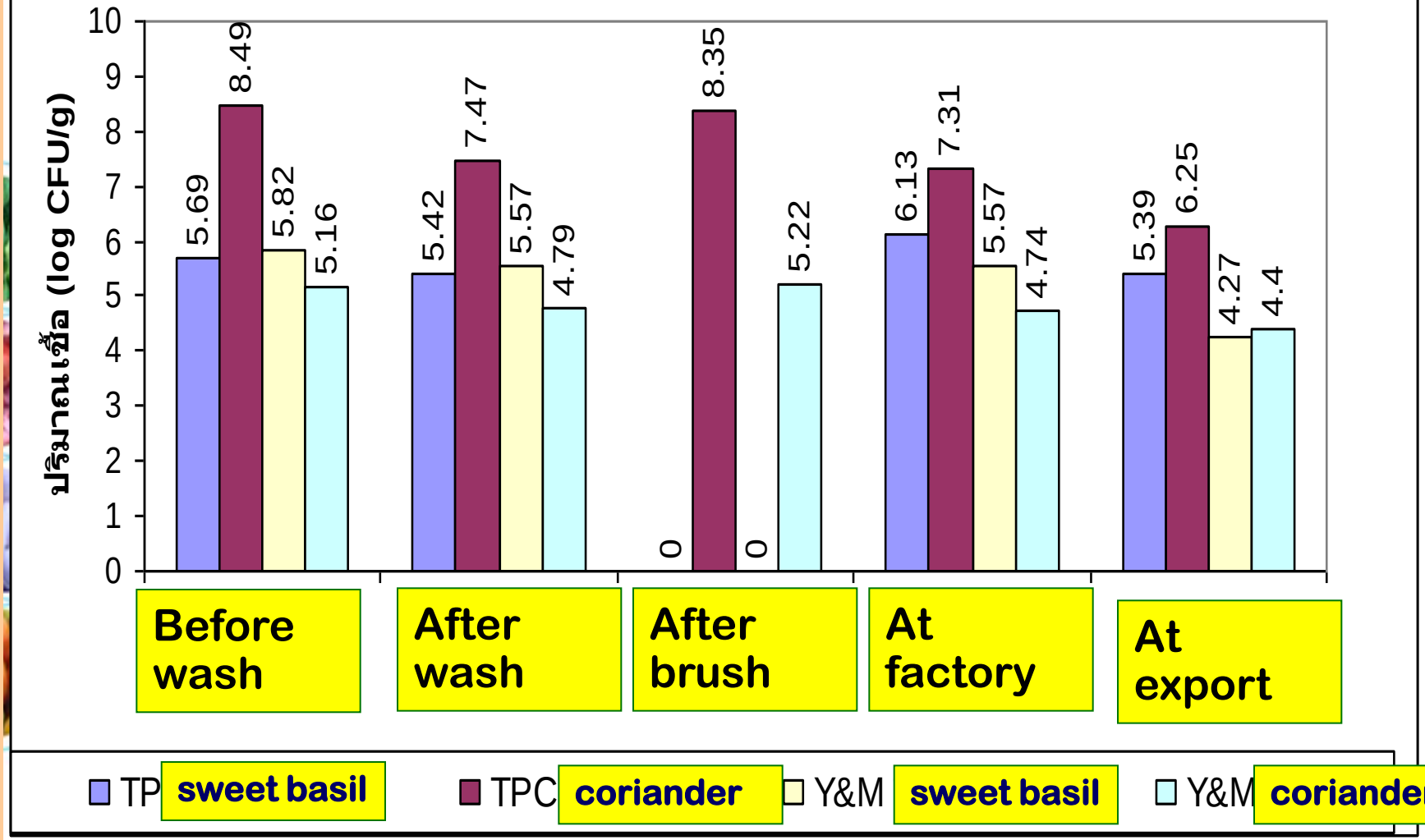
- Training of new hired personnel to understand the significant of food hygiene. Hand washing all along the food chain is critical in reducing or eliminating contamination with fecal pathogens

- Emphasize food hygiene principle at high school or middle school levels

Post harvest Considerations

- Enforce good worker hygiene.
- Clean and sanitize packing area and lines daily.
- Maintain clean wash water.
- Cool produce quickly and maintain cold chain.
- Sanitize trucks before loading.
- Be sure to keep animals out of packing house and storage facilities.

Ref. Food Safety Begins on the Farm A Grower's Guide



Total aerobic count and total yeast and mold found in sweet basil and coriander

Food Safety management consists of several steps and each step has to be controlled in order to produce the safe food for consumption.

These steps include from production or at farm level through table or consumer level, by using Good Agicaltural Practice : GAP as the criteria 7 issues as :

Good Agicaltural Practice : GAP

1. Water reservior
2. Ground
3. Hazardous substances
4. Pesticides
5. Harvesting and post harvesting
6. Storage and handling
7. Recording

From post harvesting up to packing house and processing house, using of Good Manufacturing Practices: GMP as Thai FDA (193) are mandated which consists of major 6 issues as :

Good Manufacturing Practices : GMP

1. Building and premises
2. Equipment and machines
3. Process control
4. Facilities and Sanitation
5. Maintenance and Cleaning
6. Personal Hygiene

Besides GAP and GMP system many countries encourage to apply the Hazard Analysis and Critical Control Point : HACCP as additional system to prevent and control the problem of food safety

Food Safety and Quality Management

Good Agricultural Practice (at farm)

Good Manufacturing Practice (at collecting house , packing house and food manufacturing)

Hazard Analysis Critical Control Points

Hygienic Practices (at retail sale)

Risk communication (at point of consumption)







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เพื่อคุณภาพชีวิตที่ดี
Food Safety for Better Life


รายงานการตรวจสุขลักษณะ
ของร้านอาหาร
18 9:24


Foodborne Illness

Thank you

Reference

U.S. Dept. of Health and Human Services, FDA . Center for Food and Applied Nutrition (CFSAN) 1998. *Guidance for Industry: Guide to Minimize Microbial Food Safety Hazards for Fresh Fruit and Vegetables*. Oct. 1998. http://www.fda.gov.

FDA. Analysis and Evaluation of Preventive Control Measures for the Control and Reduction/Elimination of Microbial Hazards on Fresh and Fresh-cut Produce. *Chapter IV and Chapter V.* http://www.fda.gov.

Rangrajan A. *et al. Food Safety Begins on the Farm. A Grower's Guide.* Good Agricultural Practices for Fresh Fruits and Vegetables.