



Positioning Food Monitoring Activities in Risk Assessment

Importance for Food Regulatory Programs

Day 1 – 26 February, 2023

10:30 – 11:15

Purpose of Food Monitoring Initiatives



Development of Data that Help Document Baseline Levels of Chemicals in Food



Enable Identification of Key Sources of Exposure



Support Exposure Assessment: Key Representation of a Local Risk Assessment

*Ensure that Chemical hazards are not present in food at **LEVELS** that lead to adverse health effects to humans*

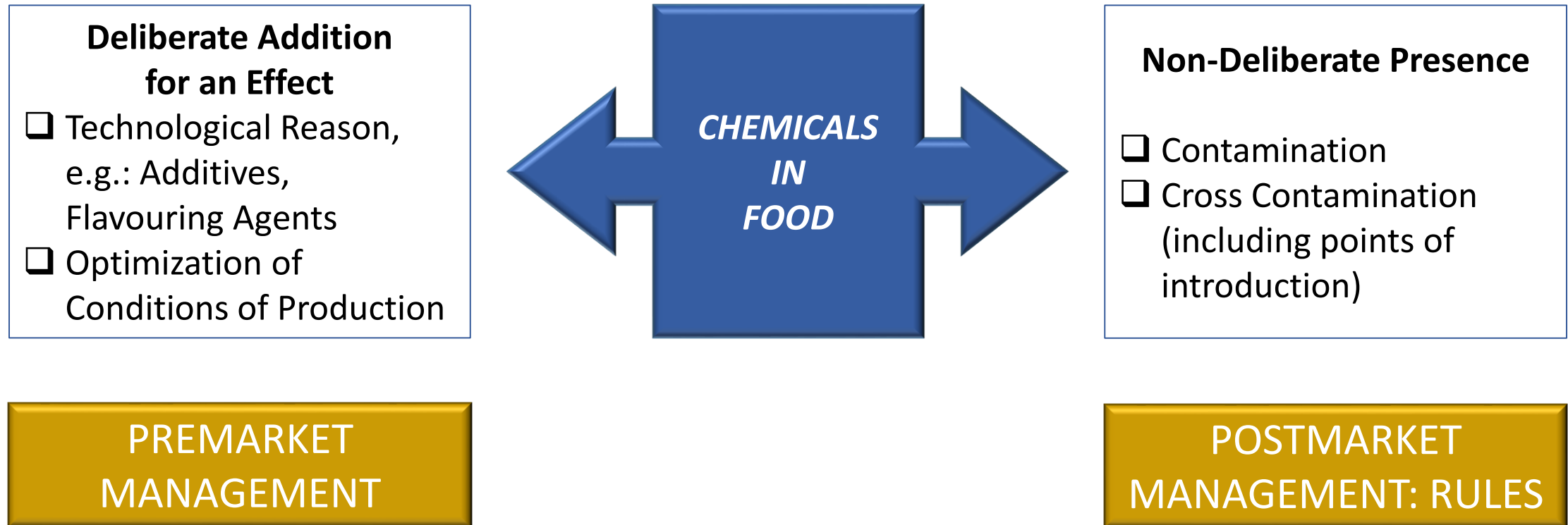


HAZARD: potential for a chemical or other pollutant to cause human illness or injury (inherent toxicity of a compound)

RISK: a measure of the probability that damage to health and/or the environment will occur as a result of a given hazard

Approach to Manage Chemicals

According to the Mode of Introduction





Collection of Data on Levels of Contaminants in Food

– *Options* –

Chemical Data Collection – Options

- ❑ Use of data generated as a result of compliance verification campaigns:
 - Target commodities / chemicals.
 - At levels close to compliance targets.
 - Occurrence data on products as sold.
- ❑ Useful for several efforts of exposure assessment:
 - E.g. Hg in fish, Cd in seafood, etc.
- ❑ Useful to monitor compliance with:
 - MRLs, e.g. pesticides and vet drugs.
 - Fortification Levels , e.g. vitamins and minerals.



□ Design and implement specific foundational surveys:

- In Food:
 - Total Diet Study.
- Biomonitoring:
 - Human Milk Survey.
 - Occurrence of targeted chemicals, e.g. PoPs, in other physiological fluids.
 - Health measures surveys, NHAENS, e.g. PoPs in blood, Na in urine.



□ Design and implement targeted programs to address specific chemicals – additives and contaminants – in response to risk management requirements:

- E.g. ochratoxin A in cereal-based products and coffee products (TDS may not offer a fulsome portrait of level of contamination and precise exposure levels).
- E.g. process-induced chemicals: acrylamide (baked products, potato products, coffee), benzene (soft drinks).

- ❑ TDS is the most cost-effective method of obtaining human exposure
- ❑ Representative of what a population consumes:
 - Purchase of foods at retail level
- ❑ Processing of foods as for consumption
- ❑ Analysis for selected analytes
- ❑ Calculation of dietary intakes using food intake data



TDS – Determination of Foods to be Sampled

❑ Based on consumption studies, including old information.



❑ Focus on key ingredients that make food products most consumed:

- Dairy products.
- Fish and fish products.
- Meats and meat products.
- Cereal-based products.
- Poultry and poultry products.



- ❑ Composites are prepared with different representation of the manner in which food is eaten.
 - E.g. Beef:
 - Roast in oven (cross rib) at 163 °C until well-done.
 - Stewing beef simmered in pot with water until well-done.
 - Composite 1:1.
- ❑ Choices have to be made, for example:
 - Pie = apple pie.
 - Cake – 1:1, yellow : chocolate cake
 - Ice cream – 1:1, vanilla : chocolate
- ❑ Use of water available for cooking in a given city.



Example of Dairy Products Composites

Dairy products

A01	Milk, whole
A02	Milk, 2%
A03	Milk, 1%
A04	Milk, skim
A05	Evaporated milk, canned
A06	Cream, half and half (10–12% BF)
A07	Ice cream (chocolate ice cream and ^a vanilla ice milk) ^b {1:1} ^a
A08	Yogurt (plain, low fat and strawberry, sweetened, pre-stirred)
A09	Cheese (cheddar, sharp or ^c mild)
A10	Cheese, cottage (creamed, 4% BF)
A11	Cheese, processed (cheddar)
A12	Butter



Example of Composites

Meats and meat products

- B01 Beef, steak (sirloin) [broil in oven to medium-well done]^d
- B02 Beef, roast (cross rib roast [well done in oven at 163°C]^d **and** stewing beef [simmer in pot with water until well done]) {1:1}
- B03 Beef, ground (regular) [heat 350-g patties on pan in oven at 176°C until well done]
- B04 Pork, fresh (roast [roast at 163°C in oven until well done] **and** chops [fry in pan on trimmed fat]) {1:1}
- B05 Pork, cured (ham [bake at 176°C in oven until well done], bacon [heat at 176°C in oven until crisp] **and** sausage [heat at 176°C in oven until done]) {2:1:1}
- B06 Veal (cutlets) [fry using trimmed fat]
- B07 Lamb (chops) [broil on rack in oven]
- B08 Cold cuts and luncheon meats (ham, salami **and** bologna, luncheon meat type, not hard) {1:1:1}
- B09 Luncheon meats, canned (beef canned **and** pork canned) {1:1}
- B10 Organ meats, liver **and** kidney (beef **or**^a calf liver, **and** chicken liver **and** beef kidney) [simmer in minimum water and drain] {1:1:1}
- B11 Wieners (all beef **or**^a pork and beef) [boil and drain]
- Poultry and poultry products
- C01 Eggs (medium) [boil 15 min]
- C02 Poultry, chicken and turkey (small chicken **and** small turkey) [eviscerate and roast at 176°C until well done]



Addition of Special Category of Foods

Foods to be cooked in package

- M01 Popcorn (microwave)
- M02 Frozen entrees (microwave **or** boiling) [boiled in water]
- M03 Frozen entrees (microwave **or** boiling) [same as composite M02 but prepared in microwave oven]
- M04 Frozen entrees (microwave **or** oven) [prepared in conventional oven]
- M05 Frozen entrees (microwave **or** oven) [same as composite M04 but prepared in microwave oven]
- M06 Frozen dinner, beef + vegetables with or without dessert [cook as label directs]



Fast foods

- N01 Pizza
- N02 French fries
- N03 Hamburger
- N04 Fish burger
- N05 Chicken burger
- N06 Hot dog
- N07 Chicken (breaded, fried, nuggets **or** pieces)
- N08 Egg breakfast on a bun **or** bagel **or** muffin **or** croissant



Special Category may include targeted populations

Baby foods

L01

Cereals (mixed) [following label directions, prepare using whole milk composite A01]

L02

Desserts

L03

Dinners (cereal + vegetable + meat)

L04

Dinners (meat **or** poultry **and** vegetable, e.g., beef dinner, chicken dinner)

L05

Formulas, milk base, ready-to-use

L06

Formulas, soya base, powder [follow label directions]

L07

Fruit (apple **or** peaches)

L08

Meat, poultry **or** eggs

L09

Vegetables, peas

Foods to be cooked in package



Target Analytes: Examples

- ❑ Dioxins, furans, brominated diphenyl ethers
- ❑ Trace elements:
 - Pb, Cd, Al, Co, Zn, Cu, Rb, Sr, Y, Mo, Ba, La, Ce, Tl, Bi, Th
- ❑ PCBs (40 congeners)
- ❑ Pesticides (over 65 compounds)
- ❑ Acrylamide, Furan
- ❑ Nitrosamines
- ❑ Radionuclides
- ❑ Disinfection by-products

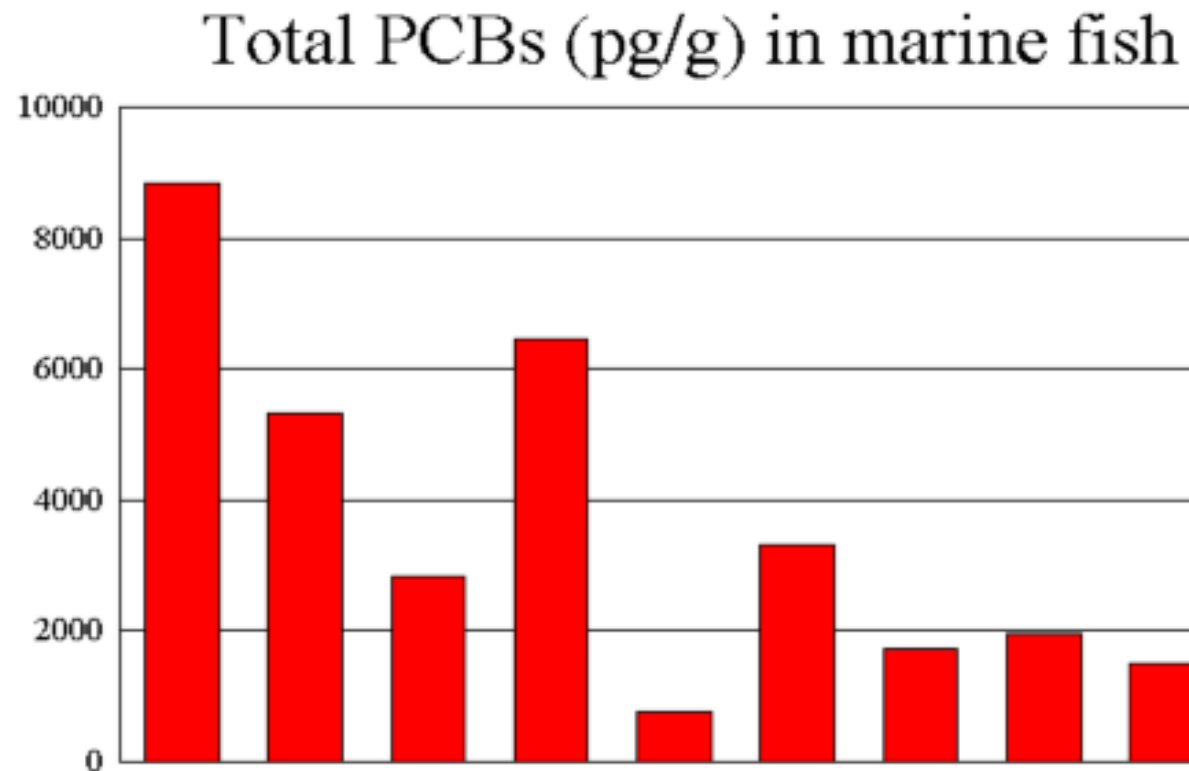


% CONTRIBUTION OF FOOD GROUPS TO TOTAL MERCURY AND DIOXIN TEQ INTAKES BY 1-4 YEAR OLDS

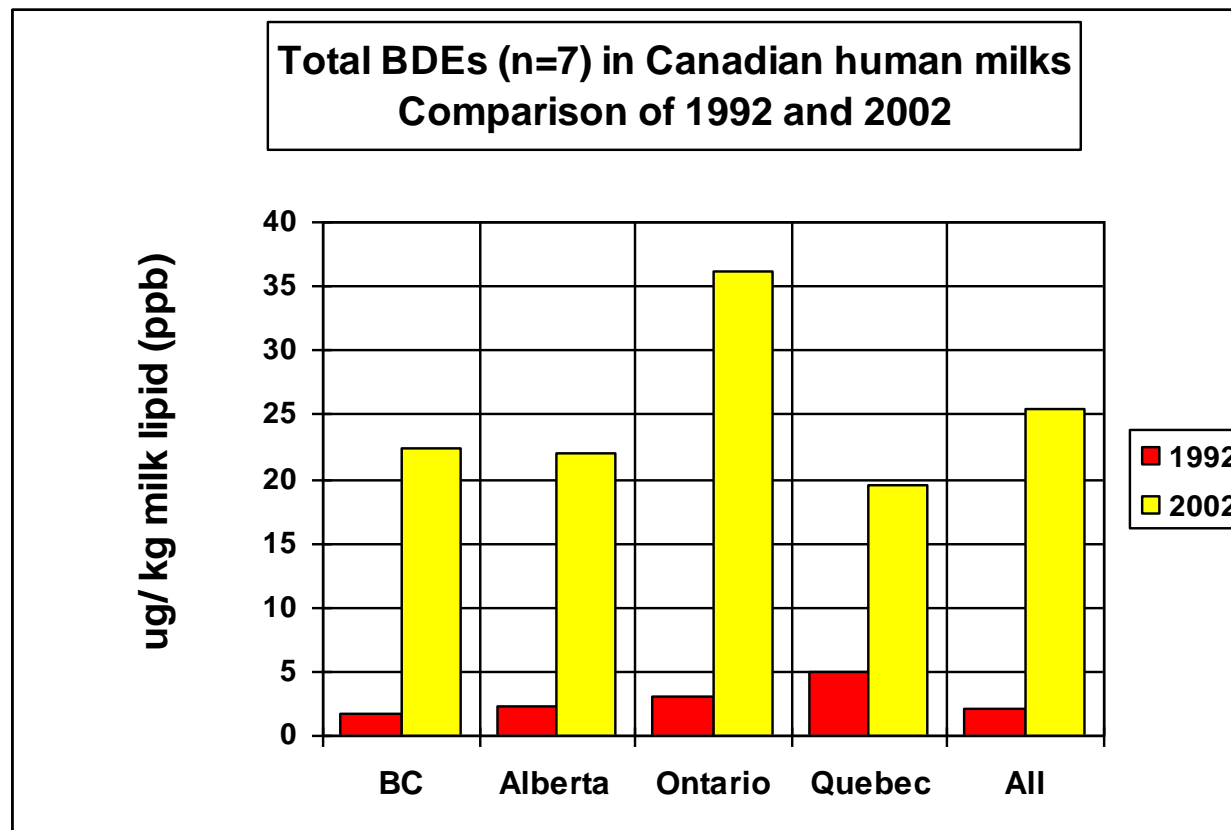
FOOD CATEGORY	Hg	TEQ
MILK, DAIRY	22	62
MEAT	8	17
POULTRY	8	13
FISH	40	1.1
SOUPS	1.7	1.5
FATS AND OILS	0.3	2.2

Importance of TDS

Effectiveness of Risk Management Strategies



Human Biomonitoring – Human Milk



Monitoring of Chemicals in Food

Is an Important Element of
Risk Management Strategies
for Chemicals in Food

A_s

L_{ow}

A_s

R_{easonably}

A_{chievable}

Same Old... Same Old... Yet NEW... Priorities of 2007²¹

Persistent organic pollutants (POPs):

- E.g. Dioxins/Furans, PCBs, old pesticides – OCs.

Emerging contaminants:

- E.g. PBDEs, PFCs, etc.

Priority toxic elements:

- E.g. Lead, methylmercury and cadmium.

“Ionic toxicants”:

- E.g. Perchlorate.

Process-induced chemicals:

- E.g. Acrylamide in fried and baked foods, furan in baby foods, semi-carbazide in baby jar sealants or in baked foods, Benzene in soft drinks

Sudan colours in food (Fraud Issues).

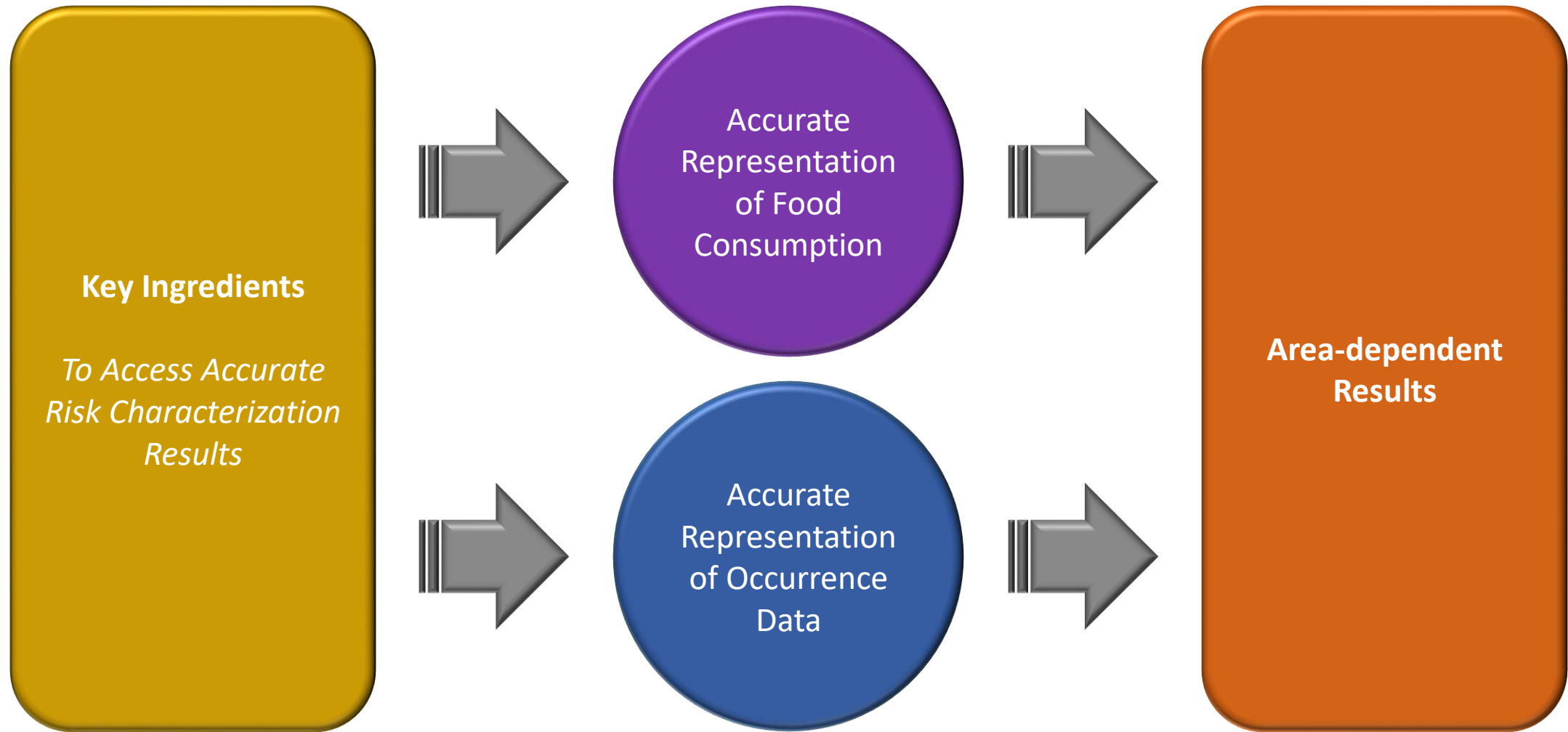
Malachite green in seafood (domestic and imported) – Fraud Issues (Illicit Fungicide Use).

Unapproved veterinary residues in foods:

- Chloramphenicol in seafood and honey, nitofurans / fluoroquinolones in aquaculture products.



Risk Characterization – Key Ingredients



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