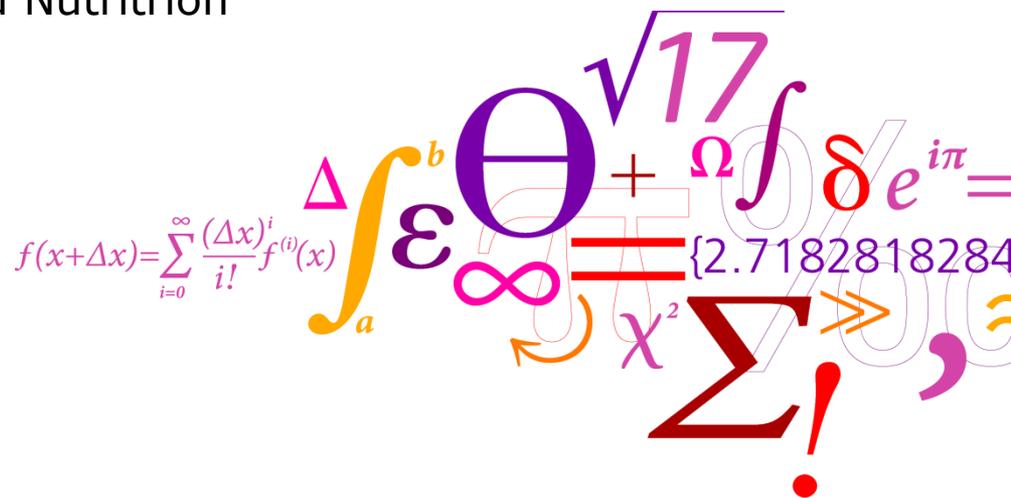


# Dietary exposure of the Danish population from contaminants and pesticides

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# Content

- Only dietary exposure (intake)




## Chemical contaminants 2004-2011



DTU Food  
National Food Institute



## Pesticide Residues Results from the period 2004-2011



DTU Fødevarer og Tilsted

<http://www.food.dtu.dk/english/Publications/Food-safety/Chemical-contaminants>

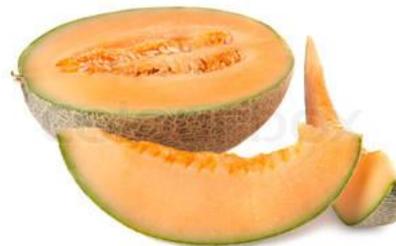
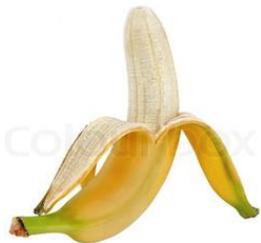
*Exposure = Consumption x Concentration/bodyweight*

Consumption = how much is eaten

Concentration = how much of the substance in the food

# Challenges in exposure

- What is analysed and what do we eat
- Processing
- Non-detects
  - Results < reporting limits



# Risk assessment

- Comparing exposure with the health-based guidance
  - E.g. Acceptable Daily Intake (ADI) or Tolerable Daily Intake (TDI)
  - Be as low as possible

Or

- Margin of Exposure (MOE) is calculated
  - Change in effect level is compared with exposure
  - Be as high as possible
- Endocrine disrupting effects and neurotoxicity not evaluated for all the substances

# Contaminants – exposure assessment

## ENVIRONMENT

- Dioxins and PCB
- Brominated flame retardants ( $\Sigma$ HBCDD)
- Perflourinated compounds (PFOA, PFOS)
- Organochlorine pesticides, (e.g. DDT, lindane, dieldrin)



## PROCESSING

- Acrylamide
- PAHs



## NATURAL OCCURRING

- Mycotoxins
  - DON, HT-2, T-2, Ochratoxin A
- Trace elements
  - As, in-organic As, Cd, Pb, Hg
- Nitrate

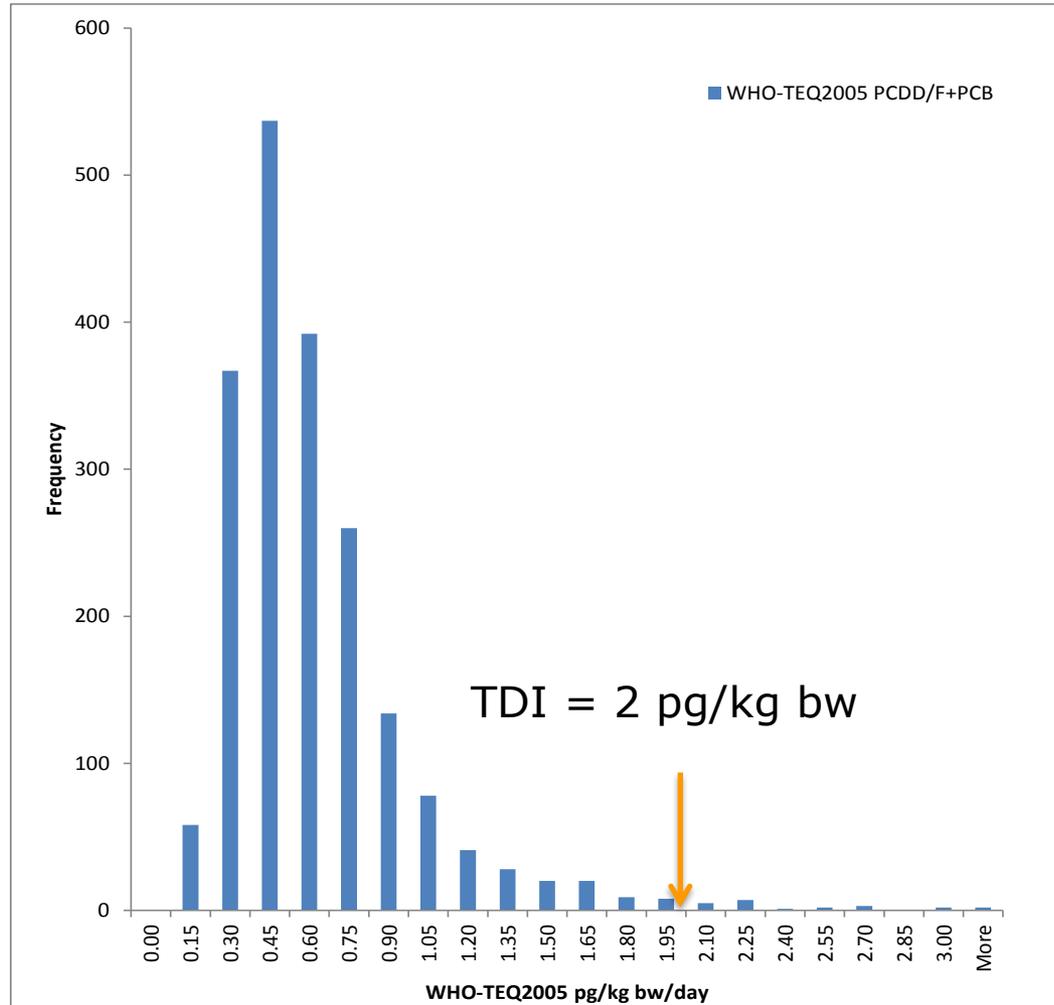


## Contaminants – conclusions

- Dietary exposure should preferably be lowered for:
  - Cadmium, dioxin and PCB
    - Exposure above health based reference values for some consumers
  - Lead, inorganic arsenic and acrylamide
    - Low MOE



# Contaminants – selected results: Dioxin and PCB



# Contaminants – selected results: Acrylamide (genotoxic and carcinogenic)

Exposure group	Adults ( $\mu\text{g}/\text{kg}$ $\text{bw}/\text{day}$ )	MOE	Children ( $\mu\text{g}/\text{kg}$ $\text{bw}/\text{day}$ )	MOE
Mean	0.19	1947	0.33	545
95 <sup>th</sup> percentile	0.46	391	0.89	202

## Contaminants – conclusions

- PAH: Relatively low MOE
- PFOA and PFOS
  - Calculated dietary exposure from fish is low compared to current TDI
  - Bio-accumulate: Desirable that exposure is lowered



# Pesticides

- Analysed samples: 17309



- Analysed pesticides: 44-238



# Cumulative: Hazard Index

- Hazard Quotient

$$\text{Hazard Quotient (HQ)} = \frac{\text{Exposure}}{\text{ADI}}$$

- Hazard index

$$\text{Hazard Index (HI)} = \text{HQ}_1 + \text{HQ}_2 + \text{HQ}_3 + \dots + \text{HQ}_p$$

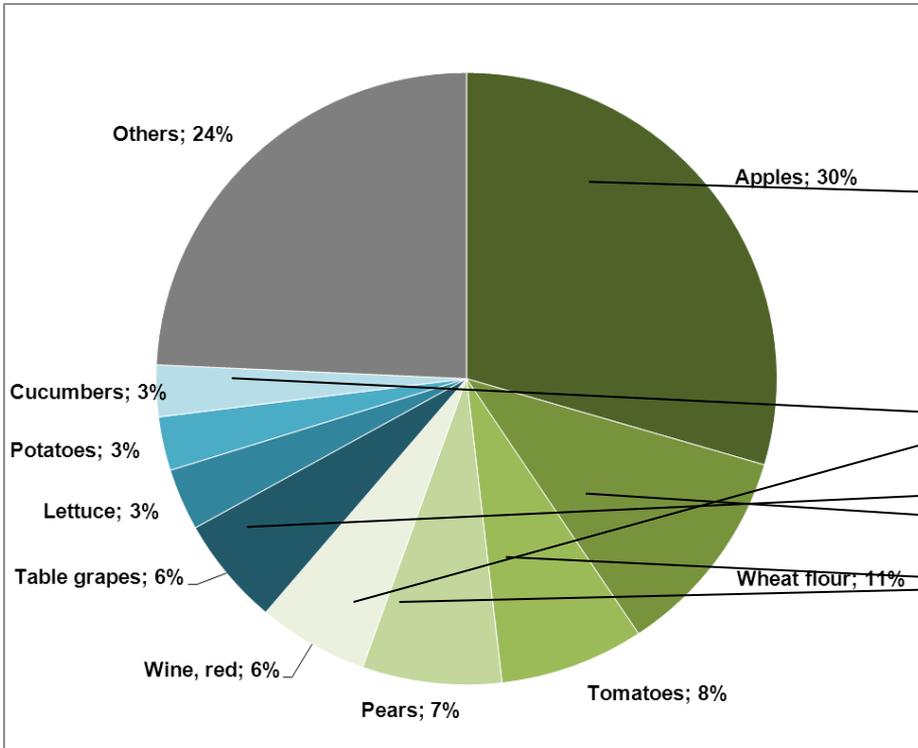
- ADI = Acceptable Daily Intake
- Substances with same effects and dose-addition is assumed
  - Here: for all pesticides



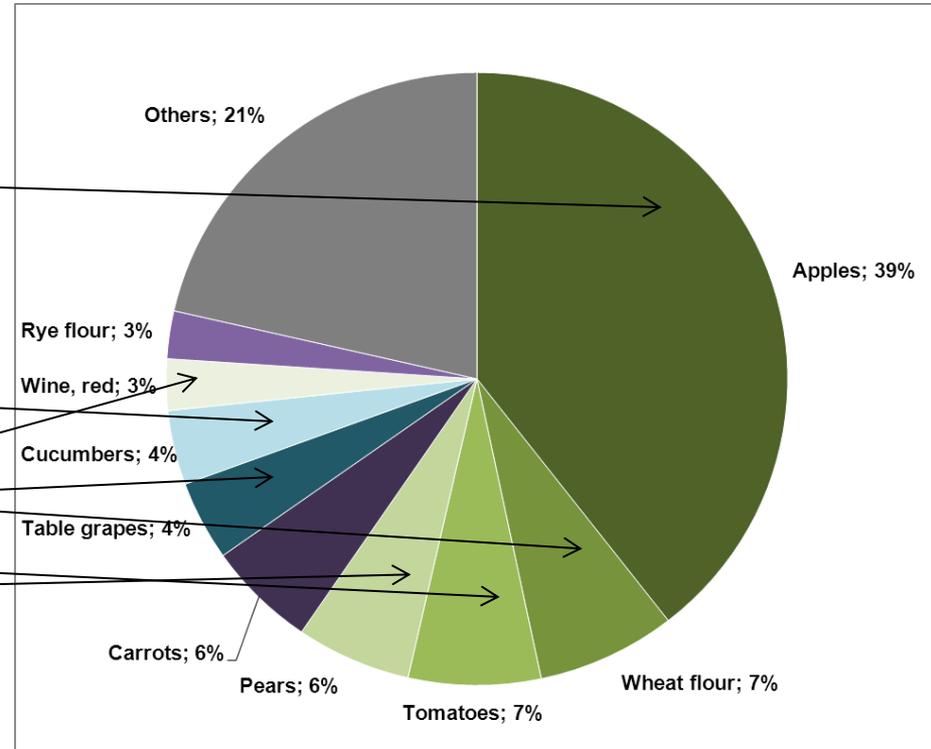
## Exposure - pesticides

	Exposure ( $\mu\text{g}/\text{kg bw}/\text{day}$ )	HI (%)
Adults, average consumption	1.9	18
Children, average consumption	4.5	44
Men, average consumption	1.6	14
Men, average consumption, domestic preferred	0.81	6
Men, high consumption	3.1	29

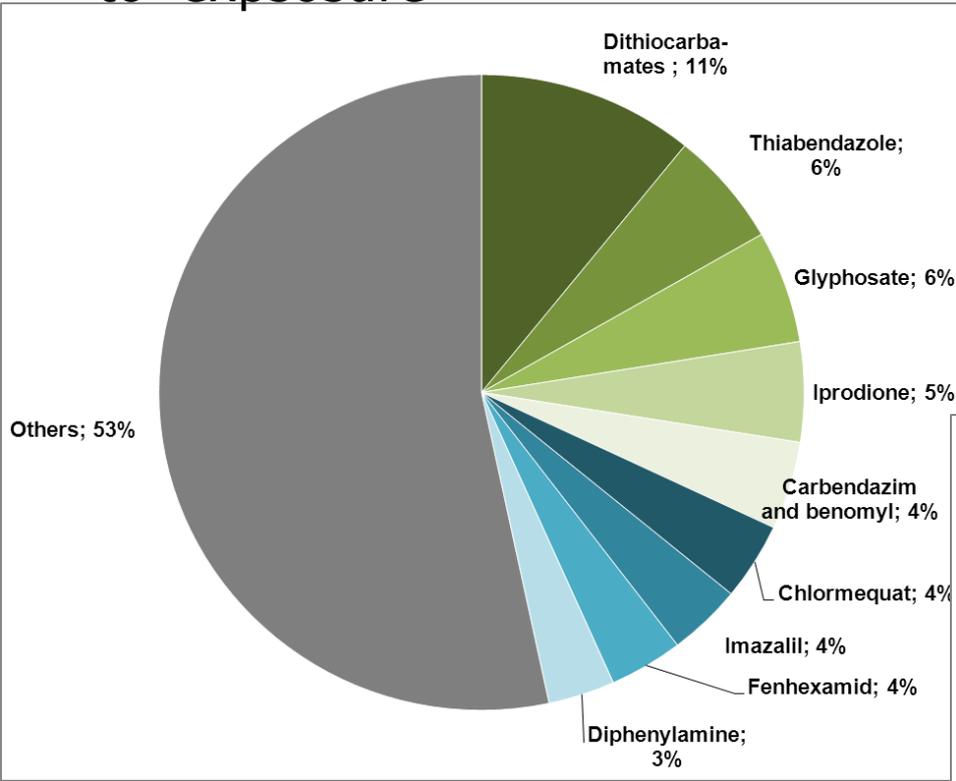
## Commodities contributing most to exposure



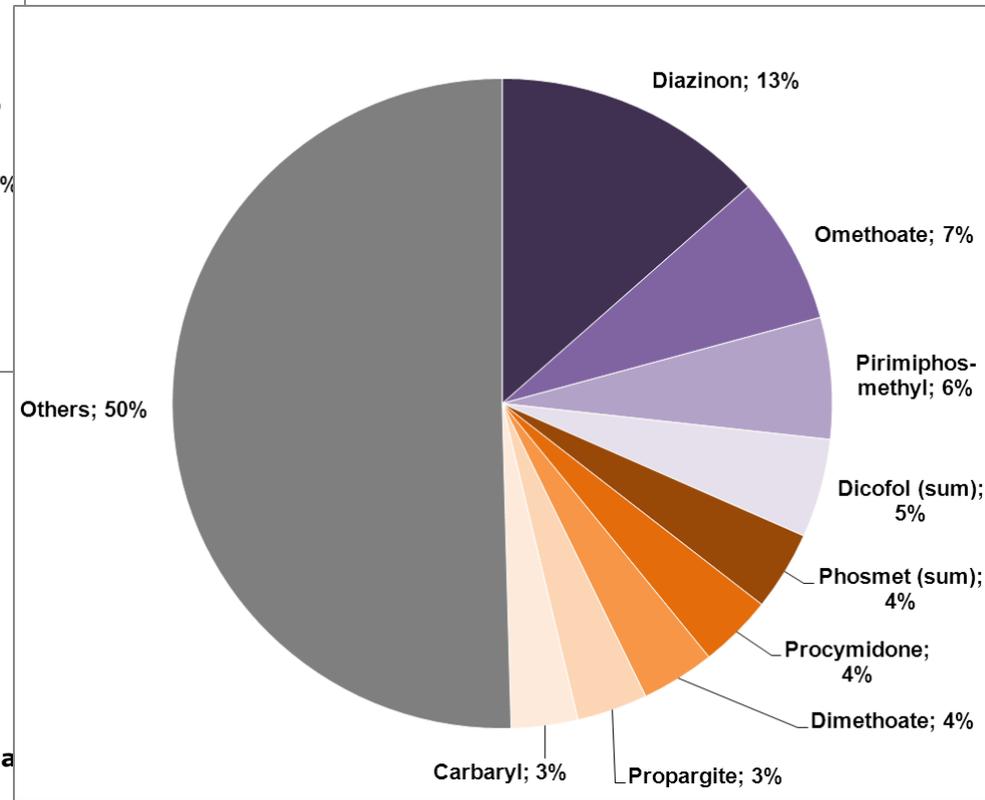
## Commodities contributing most to the HI



# Pesticides contributing most to exposure



# Pesticides contributing most to the HI



# The future

- How to improve exposure assessment from food:
  - More information about consumption and concentration in food
  - Total diet studies
    - Analyse in food as eaten
  - Probabilistic modelling
- How to improve cumulative exposure
  - More toxicological data to create common assessment groups
- Preferably estimate aggregated cumulative exposure
  - Exposure from all sources