Miljøministeriet
Miljøstyrelsen

Pesticide fate modelling in a regulatory context

DAISY workshop
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Signe Rasmussen
siras@mst.dk

Todays content - Outline

- **Approval of pesticides in the EU and Denmark**

- **Risk assessment of pesticides in EU and Denmark**

- **Pesticide fate modelling – Ground water**
  - **PELMO**
 - **Input values**

- **Interpretation of modelling results**

Active substance approval in the EU

- **An active substance is approved by the European Commission after a science based assessment to ensure a safe use.**

- **The science based risk assessment is jointly conducted by national authorities in EU member states and the European Food Safety Authority (EFSA).**
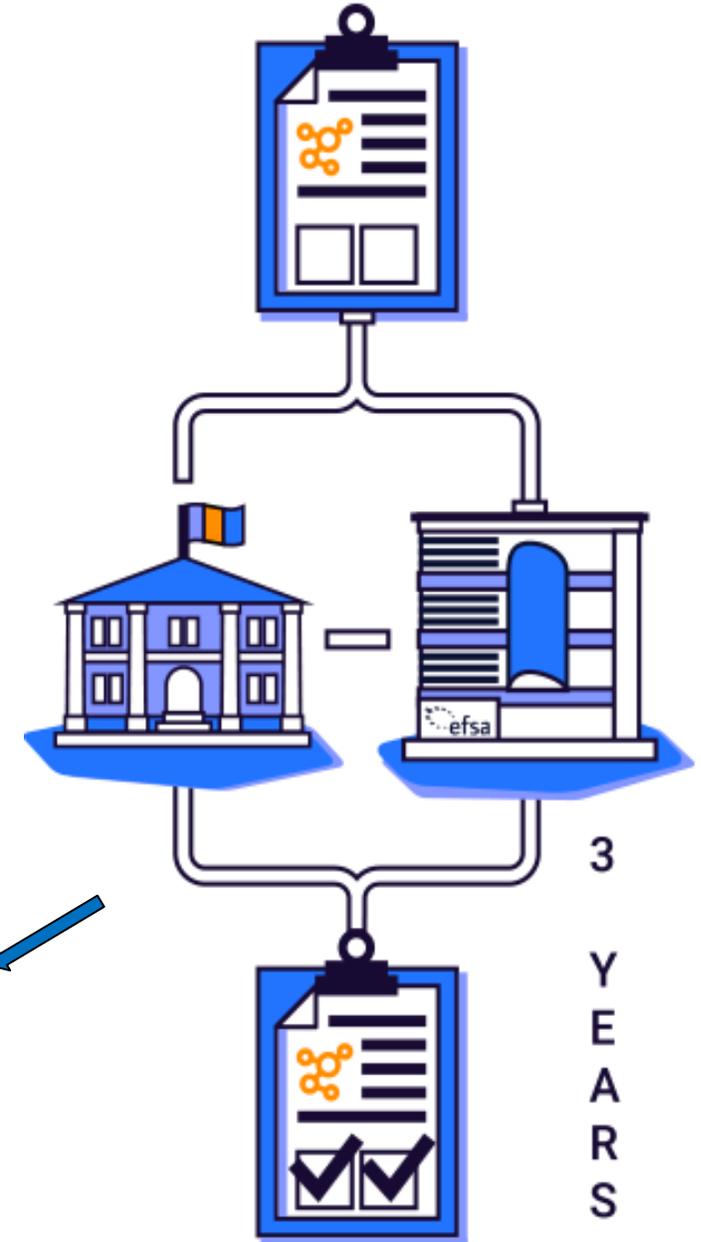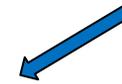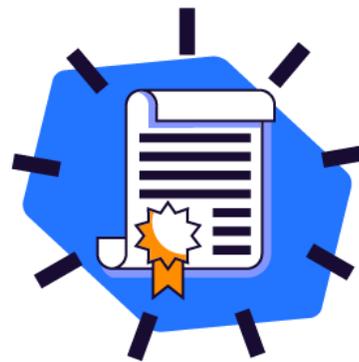
National authorization of plant protection products (PPPs)

- **A product containing the EU-approved active substance needs to be authorized by the specific EU member state in order to enter the market.**

- **The EU is split into 3 zones, where member states cooperate on conducting the risk assessment of the product.**

- **Each member state are "free" to refuse or restrict the sales of certain active substances, based on agricultural and environmental circumstances in their country.**

- **An example is increased protection of ground water in Denmark, due to the use of ground water as the sole source of drinking water.**

North
South
Centre
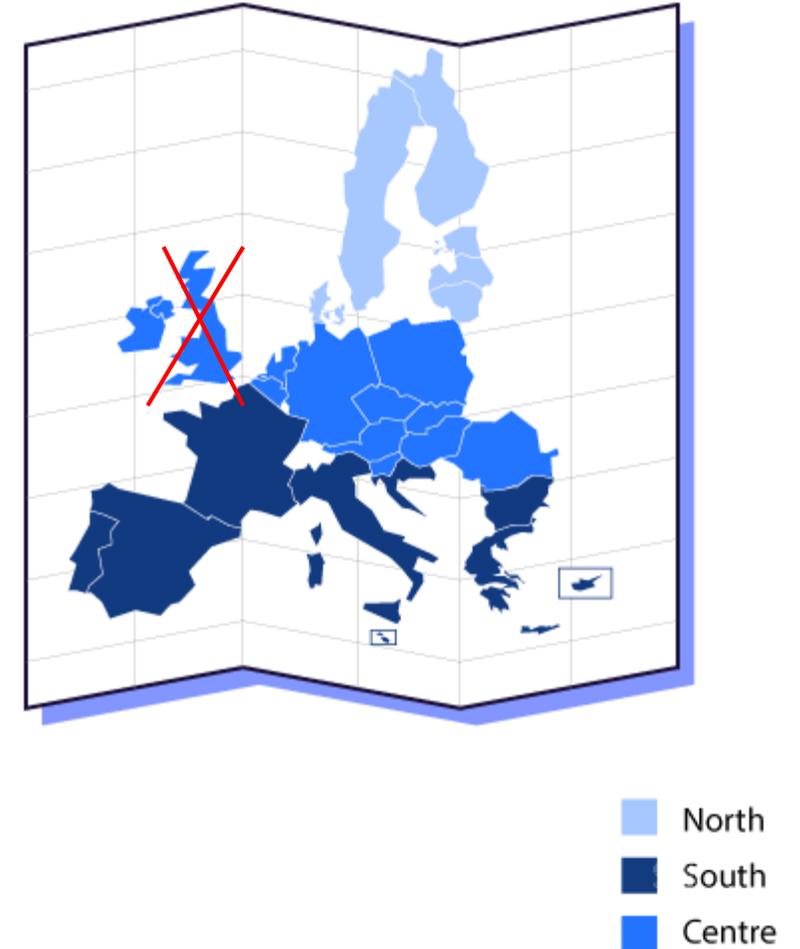
Risk assessment of active substances and metabolites
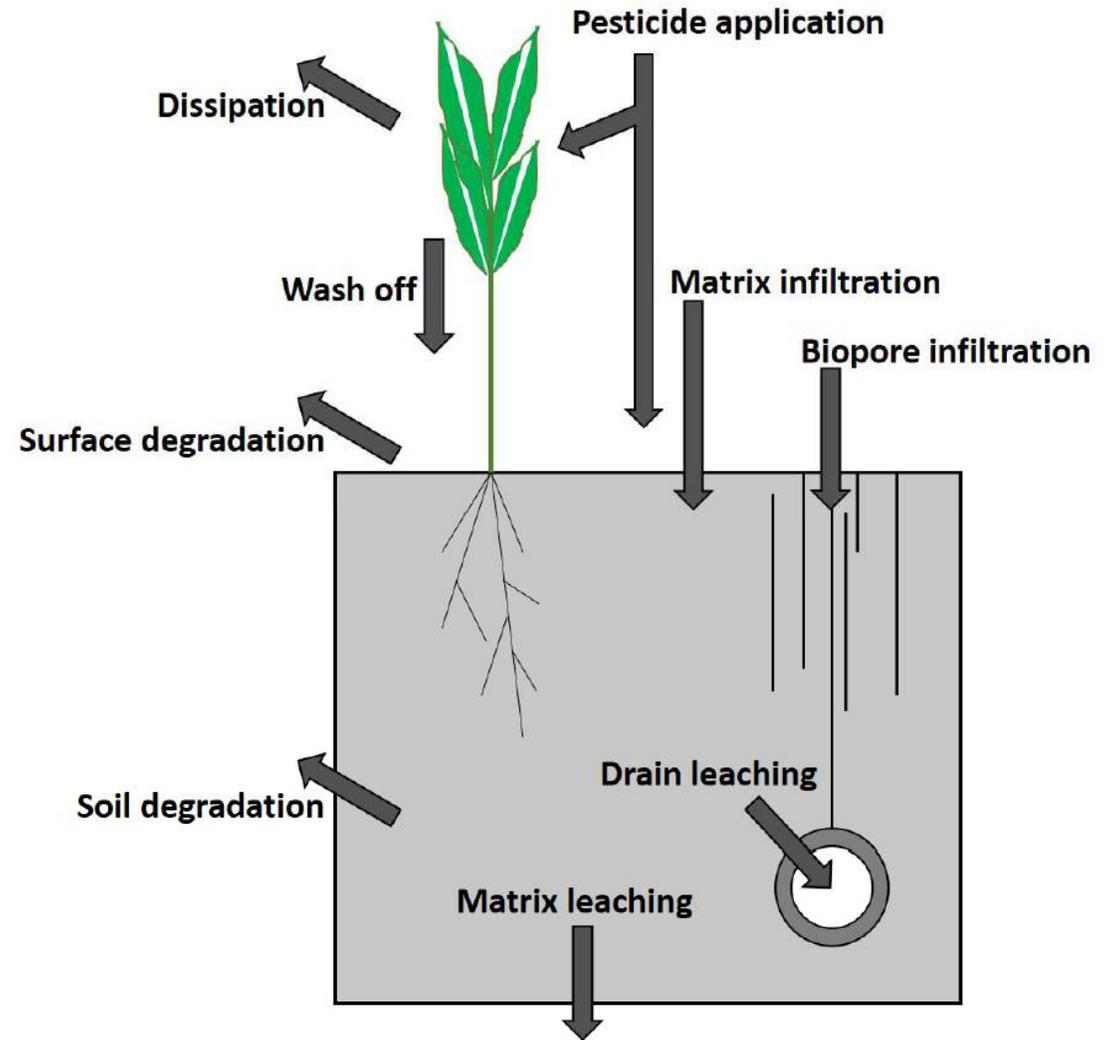
- **Efficacy**

- **Residues in plant and animal tissue**

- **Human toxicology**

- **Ecotoxicology**

- **Environmental fate and behaviour**

Environmental fate and behavior

- **PECsoil**

- **PECsurface water**

- **PECground water** **Dynamical pesticide fate modelling**

- **PECair**

PEC ground water

- **Models used:**
  - **PELMO**
  - **MACRO**
  - **PEARL**
  - **PRZM**

- **9 Ground water scenarios (containing 1 soil profile and 1*20-year weather file)**
  - **1 Used in DK – "Hamburg"**

- **15 different crops are parameterized for use in PELMO with the Hamburg scenario**

- **Data required to run the models:**
  - **Scenario**
  - **Crop**
  - **Application date and dosage**
  - **Compound specific data**
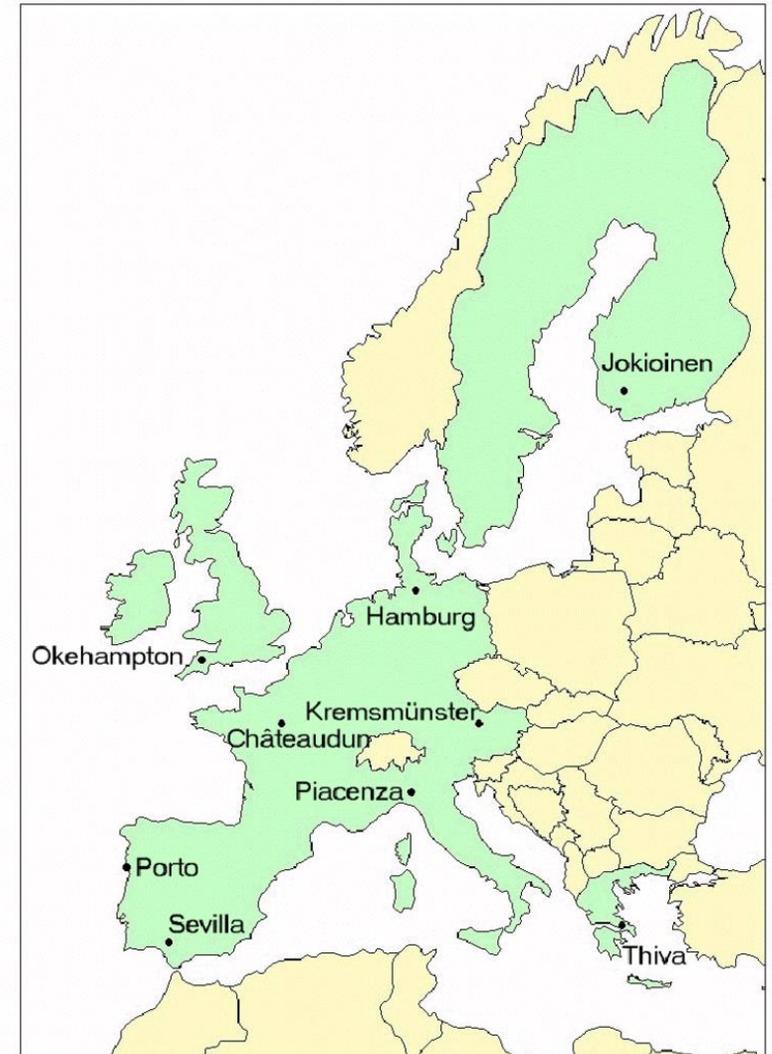
PEC ground water - PELMO

- **1 dimension**

- **Vertical transport of pesticides in the unsaturated soil system within and below the plant root zone**

- **Does NOT include preferential flow and transport**
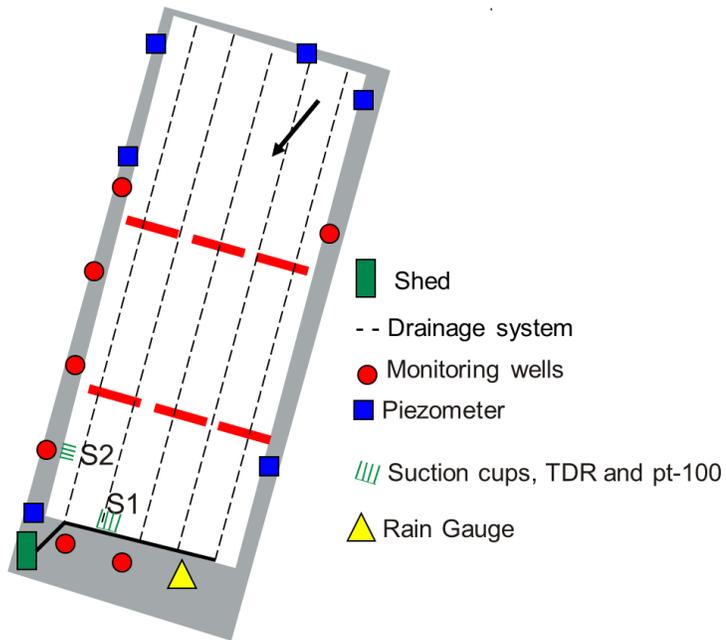
- **Does NOT include drain leaching**
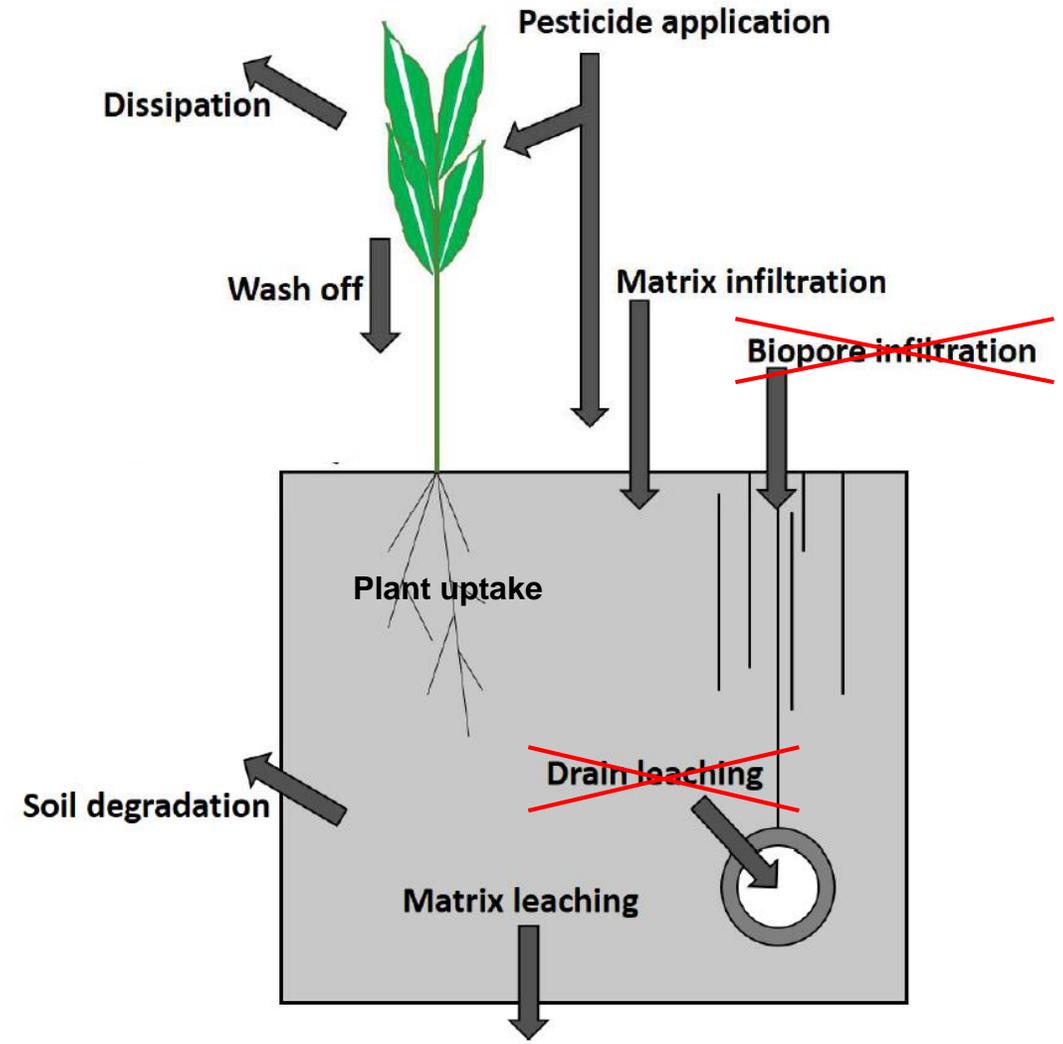
PEC ground water – PELMO – Input values

- Compound specific parameters:
  - Sorption (Kfoc, 1/n, pH-dependency)
  - Soil degradation (DT50)
  - Formation fraction (for metabolites)
  - Uptake by plant roots
  - Water solubility, Molar mass, saturated vapour pressure

- Parameters related to agricultural use:
  - Worst case situation
  - Number of applications per season
  - Date(s) of application
  - Dosage (g/ha)
  - Crop
  - BBCH at application(s)

- 20 "repetitions" (20 year weather file…)

- 6 year warm up period

- Results reported as annual averages at 1 m depth (μg/L)

- Active substance AND metabolites must be included in the modelling

PEC ground water

1) **Zonal level**

2) **National level**

3) **DK targeted monitoring***

Shed
- - Drainage system
● Monitoring wells
■ Piezometer
//// Suction cups, TDR and pt-100
▲ Rain Gauge

S2
S1

Zonal level
Standard scenarios with zonal determined input values

PECgw > 0.001 µg/L

National level
Modelling with refined parameters

PECgw > 0.1 µg/L
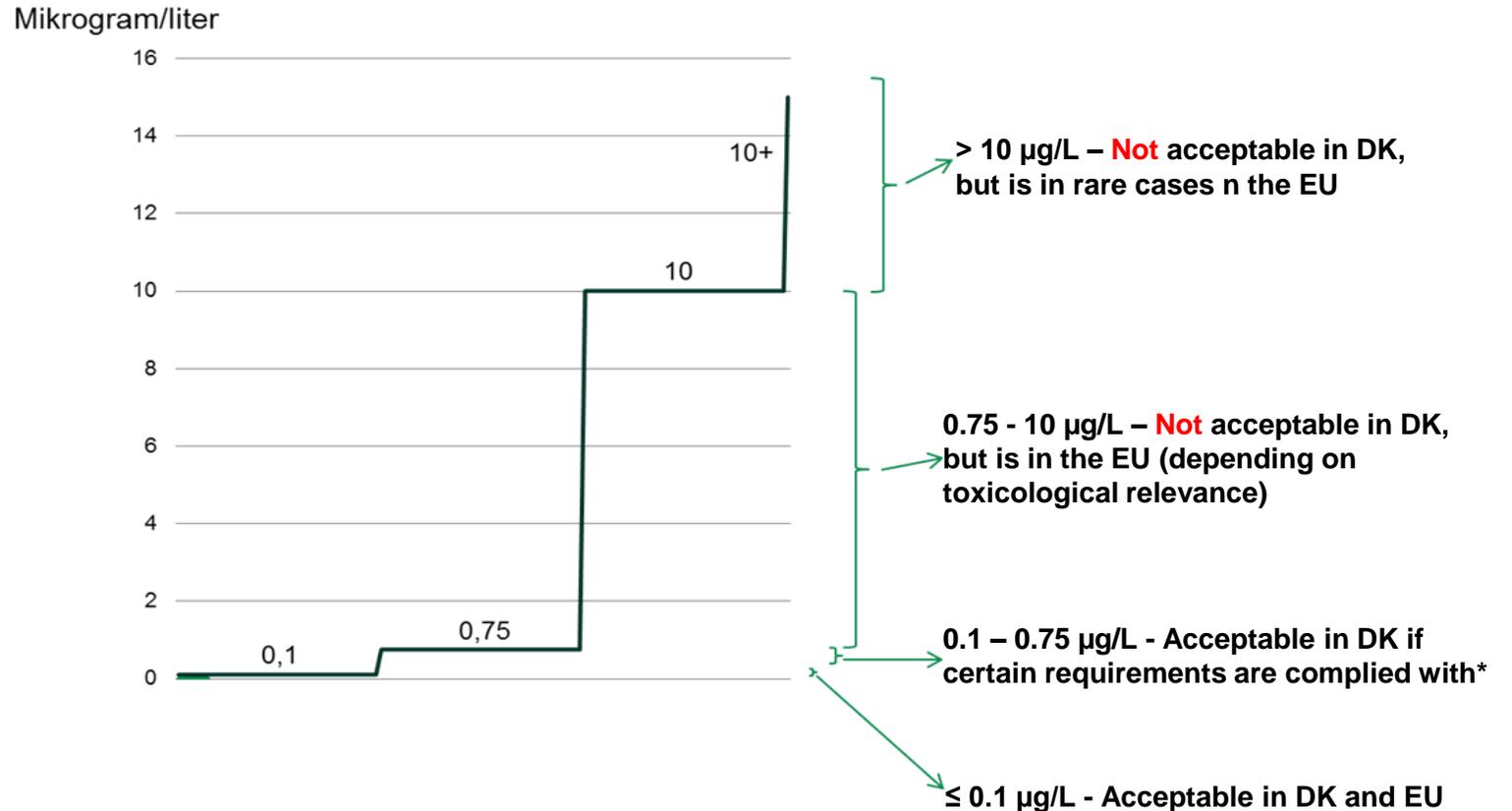
National level
Targeted monitoring*

*The Danish Pesticide leaching assessment program - PLAP
http://pesticidvarsling.dk/

Zonal modelling vs. National (DK) modelling

	Zonal modelling	National (DK) modelling
Soil degradation (DT50)	Average	80th percentile
Sorption (Kfoc, 1/n)	Average	80th percentile, 1/n 20th percentile, Kfoc
"Number of applications" simulated	1	3 repetitions
Results	5 out of the 20 annual averages may exceed 0.1 µg/L	1 out of the 20 annual averages may exceed 0.1 µg/L

PEC ground water – Limit values

- **Politically determined limit value of 0.1 µg/L**

- **Limit value for the sum of pesticides of 0.5 µg/L**

- **All metabolites are considered equally relevant…**

Mikrogram/liter

> 10 µg/L – Not acceptable in DK, but is in rare cases n the EU

0.75 - 10 µg/L – Not acceptable in DK, but is in the EU (depending on toxicological relevance)

0.1 – 0.75 µg/L - Acceptable in DK if certain requirements are complied with*

≤ 0.1 µg/L - Acceptable in DK and EU

*has not yet been practiced

Thanks for your attention – Any questions?