

# Contamination of the bee products by the beekeeping practice: Results of the Swiss Bee Research Centre



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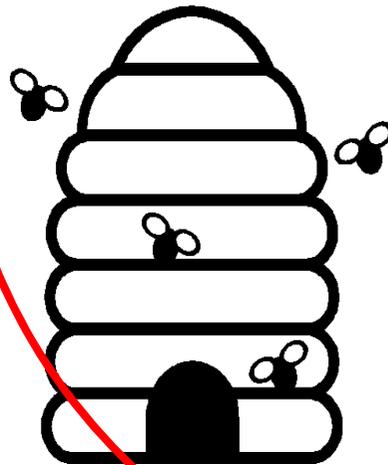
**First Organic Beekeeping Conference, 2010**

# Contamination Sources

## Environment

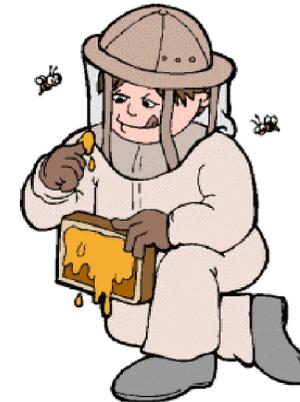
- Pesticides
- Heavy metals
- Bacteria
- GMO
- Radioactivity

Plants  
Air, Water



## Beekeeping

- Acaricides for Varroa control
- Antibiotics against AFB, EFB
- Pesticides for wax moth control
- Pesticides against SHB
- Bee repellents at honey harvest



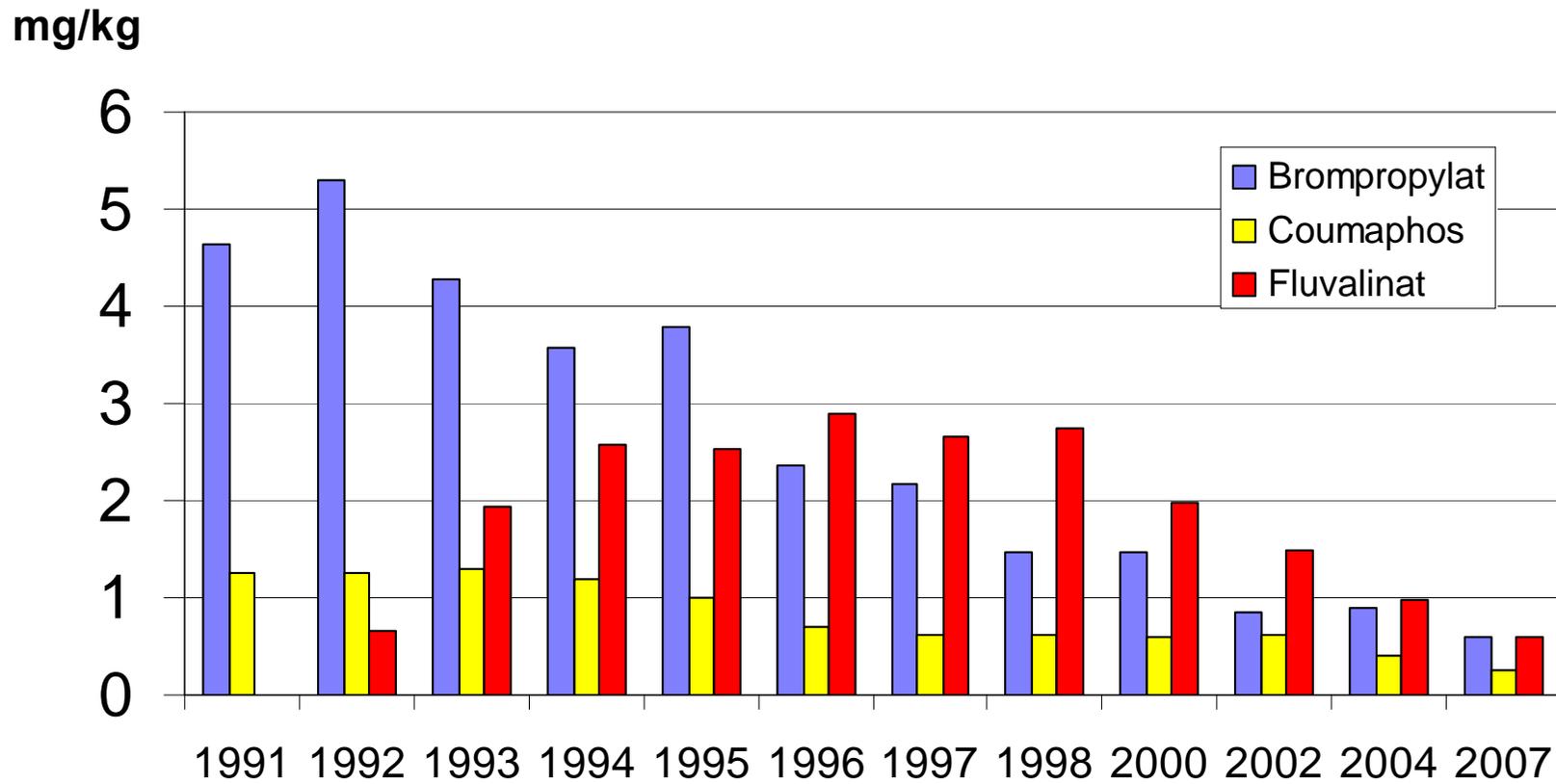
## Acaricides in the EU and in Switzerland\*

Product	Active ingredient	MRL mg/kg
<del>Volbex VA</del>	<del>bromopropylate</del>	<del>n.r.</del>
<del>Perizin</del>	<del>coumaphos</del>	<del>0.1, 0.05*</del>
<del>Apistan</del>	<del>fluvalinate</del>	<del>r.f., 0.05*</del>
<del>Bayvarol</del>	<del>flumethrin</del>	<del>r.f. 0.005*</del>
<del>Apitol</del>	<del>cymiazol</del>	<del>1</del>
<del>Apivar</del>	<del>amitraz</del>	<del>0.2</del>
Thymovar, Apilife VAR etc.	thymol	r.f.
Formic acid products	formic acid	r.f.
Lactic acid, aqueous solution	lactic acid	r.f.
Oxalic acid products	oxalic acid	r.f.

\* - Switzerland; rf: MRL-free, no residue limit necessary; n.r. no-residues permitted



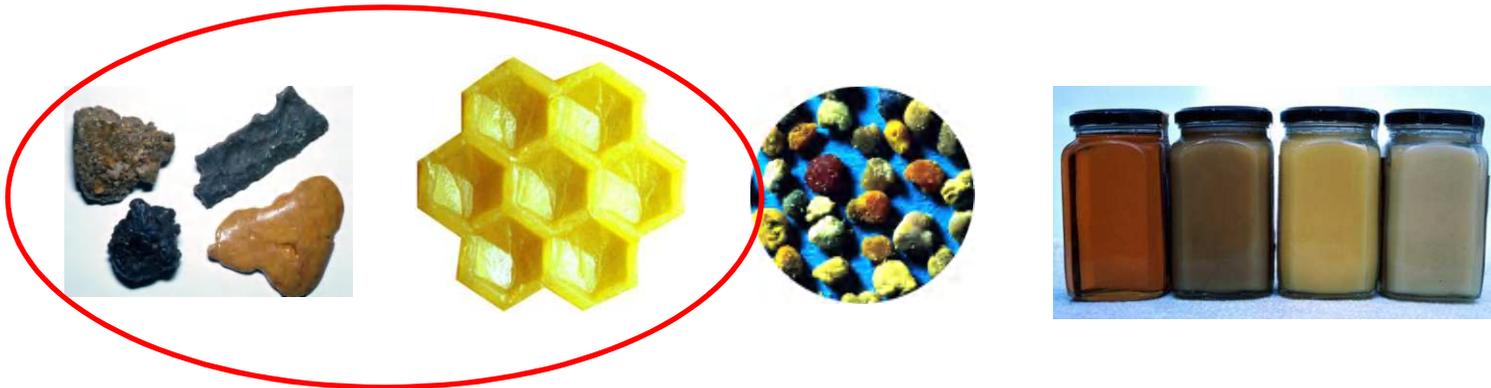
## Acaricide residues in Swiss foundation wax (averages, mg/kg)



# Synthetic acaricide residues in bee products



Contamination with synthetic acaricides:  
**Propolis** > wax >> pollen ≥ honey



# Transition to organic beekeeping: decontamination of synthetic acaricides



- Hives from colonies, where the beeswax was strongly contaminated with 10 to 20 mg/kg of coumaphos and flualinate
- Decontamination of hive walls by scratching out and flaming
- Artificial swarms were placed on residue free foundations in 2000
- Residues in beeswax measured during the next two bee seasons

**Results: in all cases the residues were below detection limit of 0.25 mg/kg**

# Natural acaricide residues in bee products?



**Varroa control by organic acids and components of essential oils**

**Substances not toxic and they are allowed for organic beekeeping, but they can alter the honey taste which is not allowed**

# Organic acid residues in bee products?



**Organic honeys are natural components of honey**  
**After long term use of organic acids in Switzerland**  
**no residues in honey above the natural level of the**  
**honeys**

**If formic acid is used in the bee season residues**  
**can be high enough to change the honey taste**

**No residues in beeswax**

**Use of organic acids outside the bee seasons causes**  
**small and non-problematic residues in honey**

# Residues of essential oils and their components in bee products?

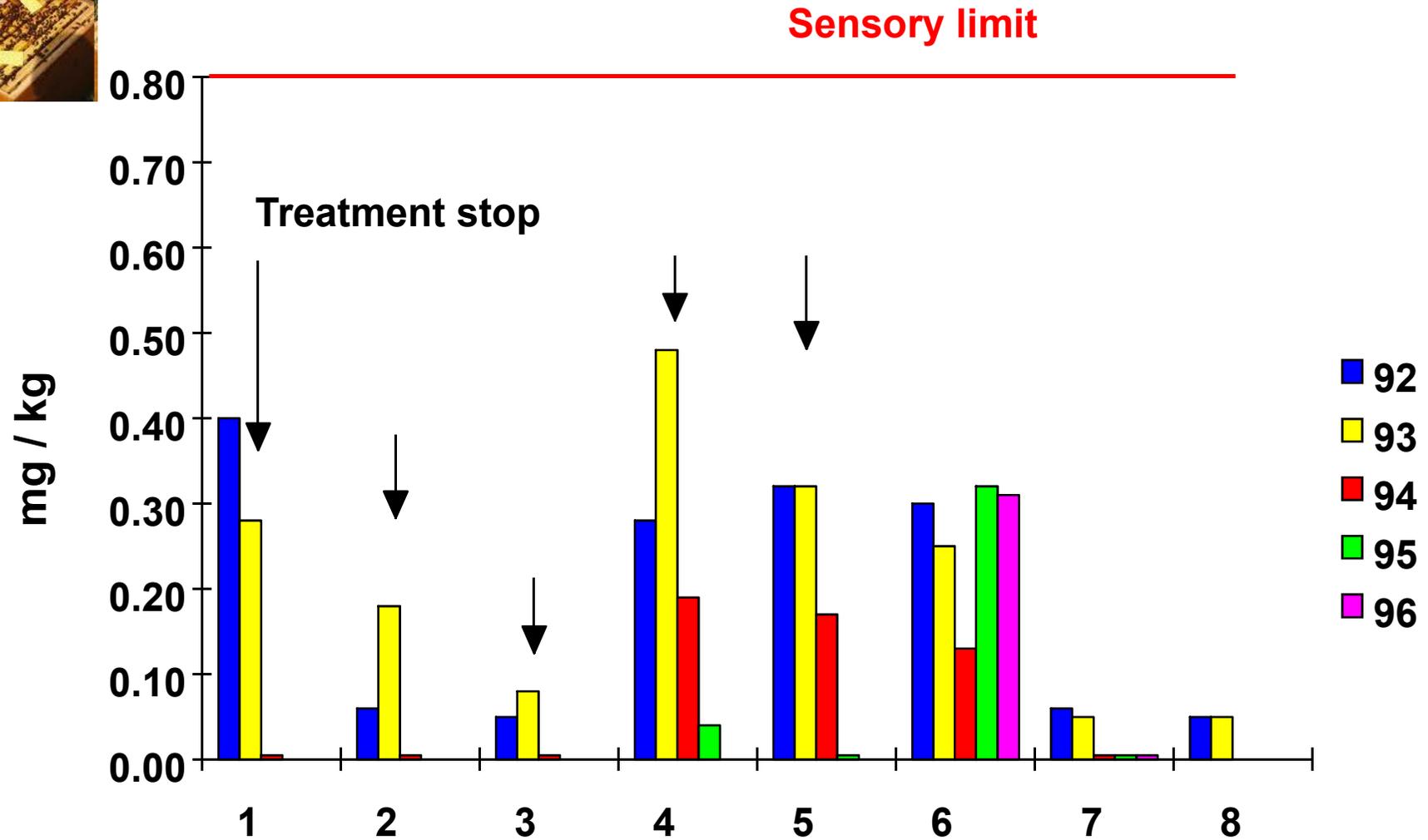


**There are different products on the market  
Best are products with known and  
constant composition**

**Only preparations with thymol as an active  
ingredient are presently on the market,  
with these preparation there is enough  
data on the residues after application**



# Residues of thymol in honey





# Residues of thymol in beeswax

After long term application of thymol the residues in comb wax reach 100 to 1000 mg/kg, but they do not accumulate with increasing number of treatment years

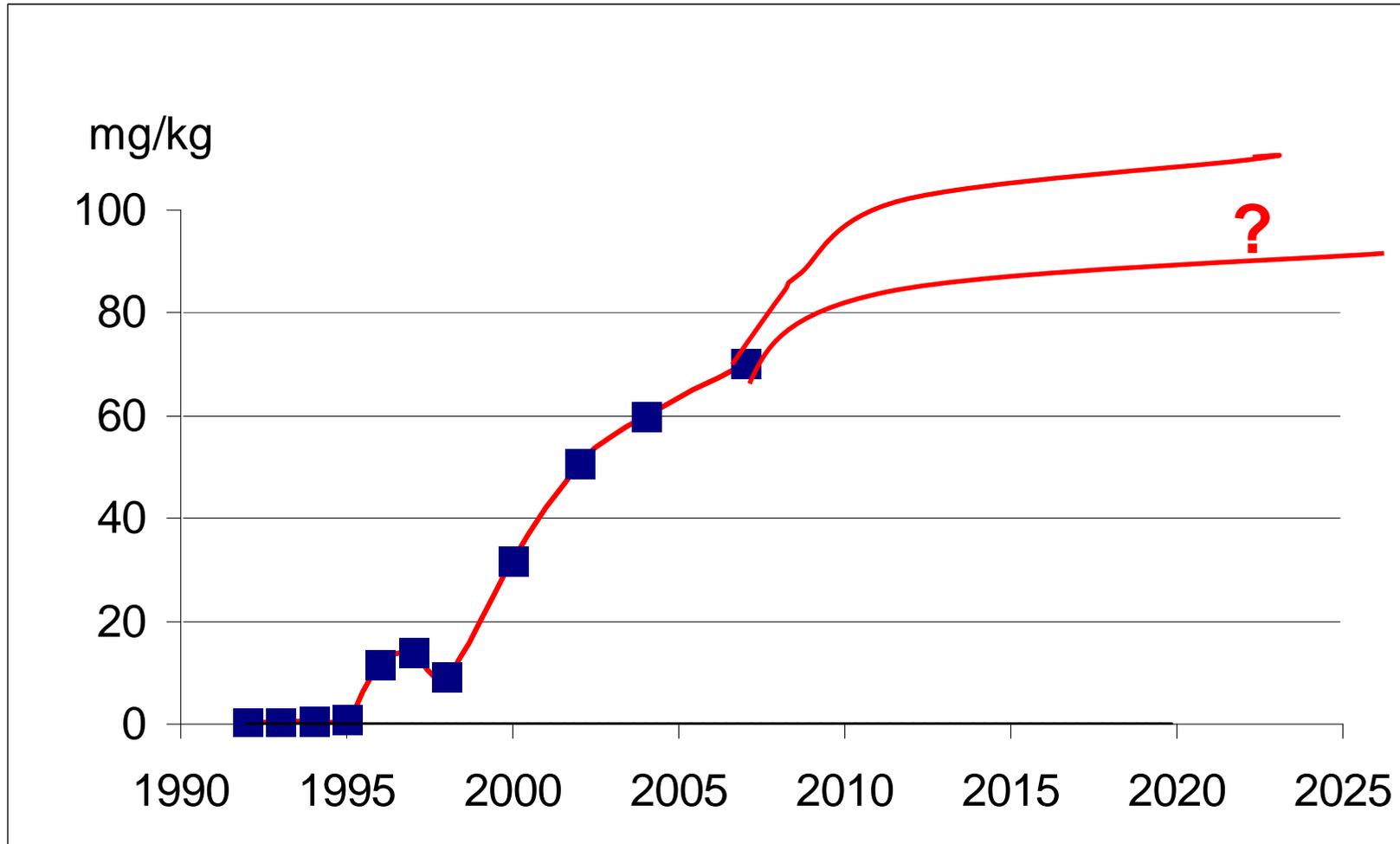
Thymol can diffuse out of the wax into honey

**Values of thymol in honey comb wax must be greater than 500 mg/kg in order that honey can be contaminated by more than 0.8 mg/kg**

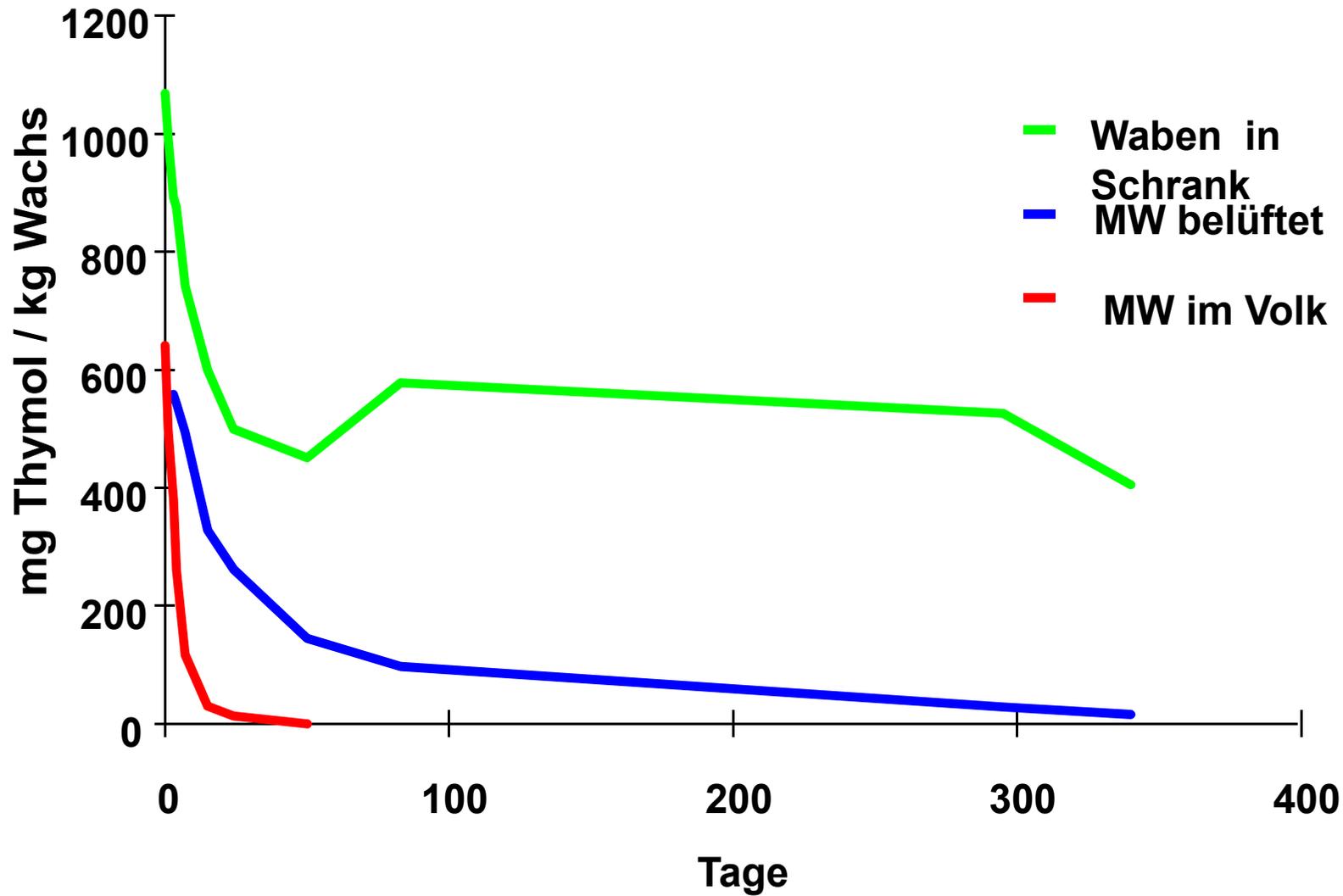
**Long term thymol use causes increased thymol content in wax, but this which will not endanger honey quality**



# Thymol in wax foundations in Switzerland



# Thymol evaporation from combs and foundations



# Residues of antibiotics in honey used against American Foul Brood (AFB)



**2000**

**25-30 % of honey imported in the European Union  
contains antibiotics**

- Sulfonamides
- Streptomycine
- Tetracyclines
- Chloramphenicol
- Nitrofuranes
- Other new molecules

**2010**

**10 % of all samples contaminated**

**More antibiotic substances detected**

Celle Apimondia Conference, 2004, Eurbee 2006, Applica 2010

# PDCB: Honey contamination in Switzerland

## Problem solution with biological control of wax moth



Biological control of wax moth by

1. Freezing of combs for at several hours
2. Destruction of wax moth by *Bacillus thuringensis*
3. Treatment of hives with formic acid

**2004: 30 % of all honeys contaminated with more than 10 ppb**

**2009: residue level of PDCB in all honeys are less than 10 ppb**

# Contamination at honey harvest



**Too much smoke cause  
change of honey taste**



**Use of brush and/or water**

# Contamination from honey recipients



**Heavy metals** from the paint of coloured vessels



**Sn, Fe** from galvanized and non-stainless steel vessels

# Contamination by wood protectants



Residues of pesticides (metal-organic substances, pentachlorophenol) contained in wood protectants were found in honey

Use of natural wood protectants

# Contamination of bee products: summary



**honey**

**wax, propolis**



antibiotics used for AFB control

synthetic acaricides used for Varroa control



# The solution is: Organic Beekeeping with careful use of organic compatible drugs

Apicoltura biologica

