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Federal Department of Economic Affairs,
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Agroscope

State of play of Disease control

Dietemann Vincent
Agroscope, Swiss Bee Research Center

Bees at a crossroads: State of play - 30.09.2015

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The importance of sanitary health

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Role of diseases in honeybee losses

Social parasites
e.g. Cape honeybee

Bacteria
e.g. foulbrood

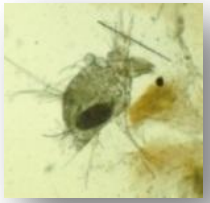
Fungi
e.g. chalk brood

Viruses
e.g. DWV

Pests
e.g. small hive beetle

Ectoparasites
outside of the bee, e.g. mite *Varroa destructor*

Endoparasites
inside of the bee; e.g. *Acarapis woodi*



Role of diseases in honeybee losses

- **global enemy number 1:**

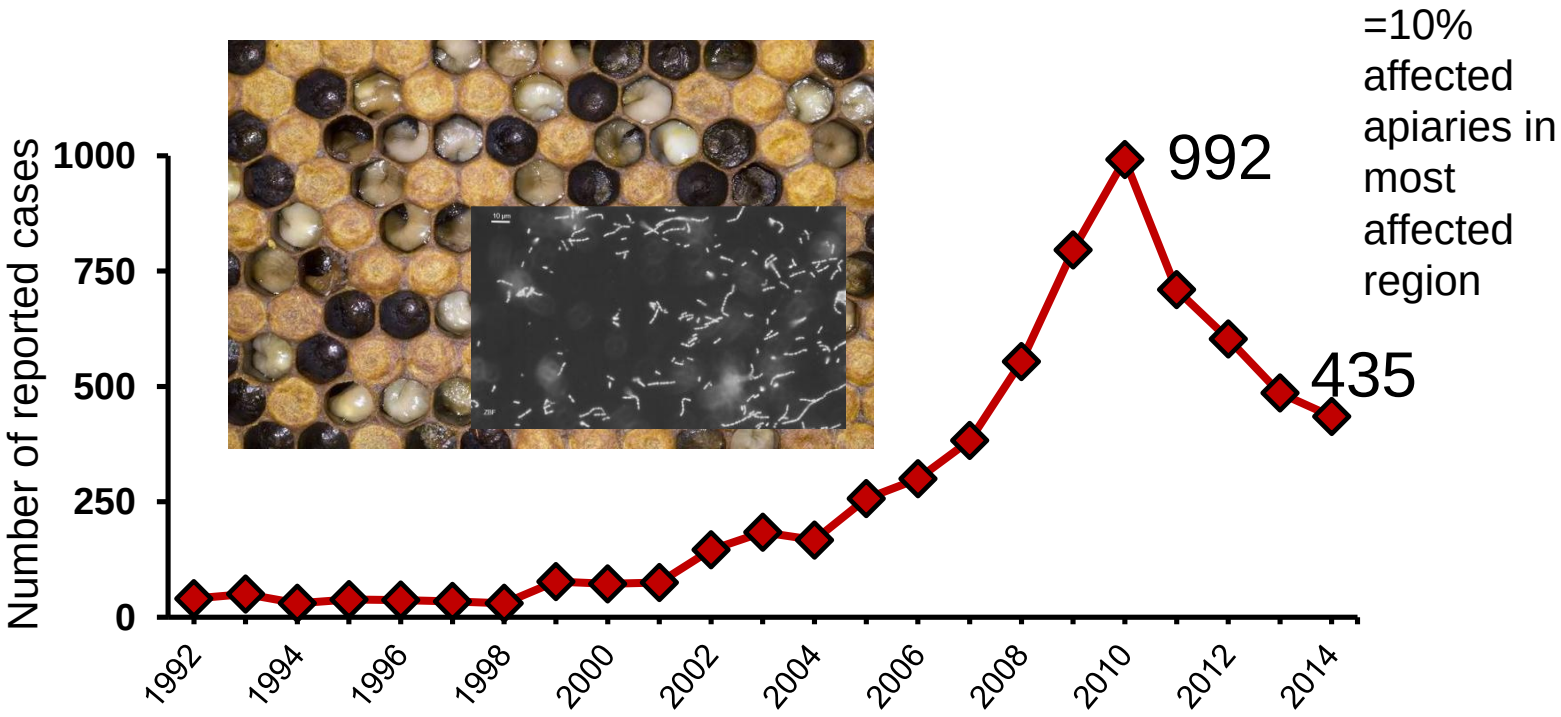
Varroa destructor

Austria (Brodschneider et al. 2010)
Belgium (Nguyen et al. 2011)
Canada (Guzman-Novoa et al. 2010)
Croatia (Gajger et al. 2010)
Denmark (Vejsnaes et al 2010)
France (Chauzat et al 2010; Le Conte)
Germany (Genersch et al. 2010)
Holland (van Dooremalen et al. 2012)
Norway (Dahle 2010)
Poland (Topolska et al. 2010, Pohorecka et al . 2011)
Scotland (Gray et al 2010)
Turkey (Akyol et al 2011)
Uruguay (Antunez et al. 2015)
USA (Schäfer et al. 2010, etc)

Role of diseases in honeybee losses

- **local phenomena:**

e.g. European Foulbrood in Switzerland



= epidemy

→ destruction of affected colonies

Background on honeybee diseases

- Why do we have so much trouble with honeybee diseases?

Before beekeeping:

- wild colonies

nesting in far apart trees, rocks…

After beekeeping

- managed colonies

in close proximity hives

- trade over long distances

→ increased risk

of disease transmission

→ increased introduction

of pathogens and parasites

Background on honeybee diseases

- Why do we have so much trouble with honeybee diseases?

Before beekeeping:
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After beekeeping
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→ increased risk
of disease transmission
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What about diseases in other bees?

- **few species managed** (Bumble-, alfalfa-, mason bee)

→ not under frequent scrutiny

→ less studied, less knowledge

- parasites: in bumblebees, solitary bees *Goulson 2003*

- pathogen spillover between species:

  e.g. deformed wing virus and *Nosema ceranae*

  exchanged between honey- and bumblebees *Fürst et al. 2014*

→ no control methods / treatments

→ treatment of wild populations would be challenging

→ avoid spill overs due to pollinator management *Goulson & Hughes 2015*

Importance for beekeepers to control diseases

diseases + X + Y + Z = colony losses

X, Y, Z might not be under direct control of the beekeepers

e.g. pesticides: use by farmer, spread, market, homologations…

preventing and curing diseases is directly in his hands

health checks and necessary treatments are his duties

for this to be possible:

- treatments / control methods available (research)
- information transfer needed (education)

Challenges to controlling diseases

treatments / control methods

- no treatments available for most diseases
  - e.g. viruses
- national regulations prevent the use of some treatments
  - e.g. antibiotics against foulbrood
  - resistance development, contamination of hive products
- treatments not sustainable
  - e.g. synthetic acaricides against *V. destructor*
- alternative treatments difficult to implement
  - e.g. organic acids against *V. destructor*
  - many steps, climate dependent, many mistakes made

→ more research needed to develop better methods

Progress made during the last years

- Interactions diseases / pesticides confirmed in the field
  e.g. Locke et al. 2012, Pettis et al. 2014, Simon-Delso et al. 2014, Alburaki et al. 2015
- Interaction varroa / virus better characterised
  e.g. Martin et al. 2013, Ryabov et al. 2014
- Pathogenicity of American Foulbrood better understood
  e.g. Poppinga et al. 2015
- 2014-2015: > 200 studies on honey bee viruses and parasites

→ much useful knowledge acquired, but
no breakthrough in improving disease control or mitigating losses

on the applied side, new formic acid based varroa control method,
= alternative to existing methods, no revolution

Challenges to controlling diseases

treatments / control methods

more research?

funding recently granted towards honey bee health,

but disproportionally little compared to the importance of disease control for colony health, pollination

- beekeeping is a ‘small’ industry, cannot fund its own R&D
- beekeeping is a ‘small’ market despite its importance (pollination)

→ little interest for R&D investment by companies,

→ research mostly at public institutions

- few funding sources for applied research (long term)

Challenges to controlling diseases

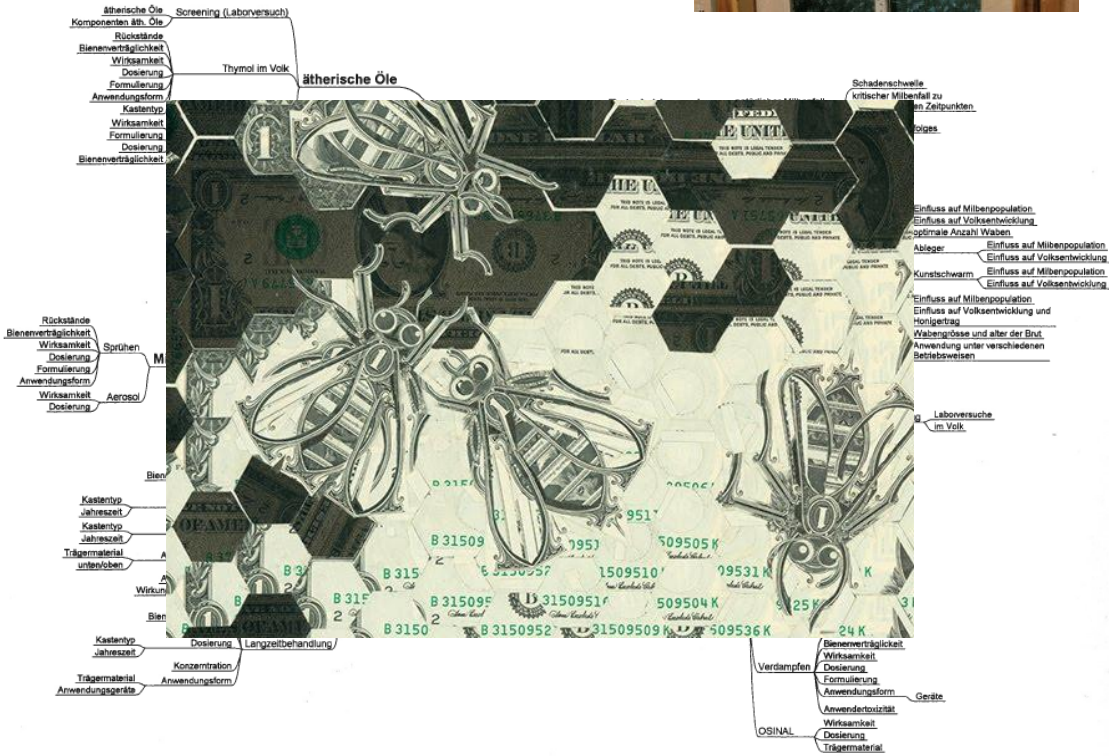
treatments / control methods

more research?

development of
current ‘alternative’
varroa control
method based
on organic acids

…

took **13 years**



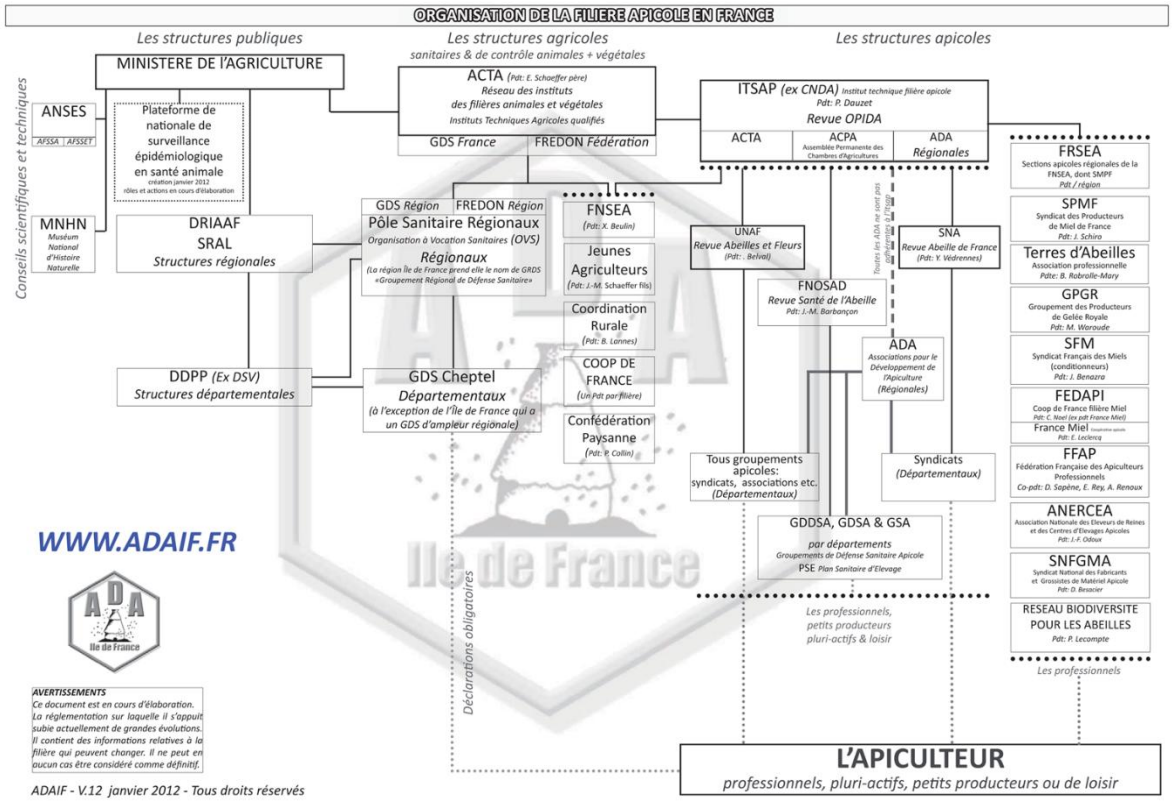
April 2003 - Zentrum für Bienenforschung - Anton Imdorf

Challenges to controlling diseases

education of beekeepers

- various structures in different countries
- variable support by national authorities
- number and diversity of beekeeper community

e.g. France



Challenges to controlling diseases

education of beekeepers

- various structures in different countries
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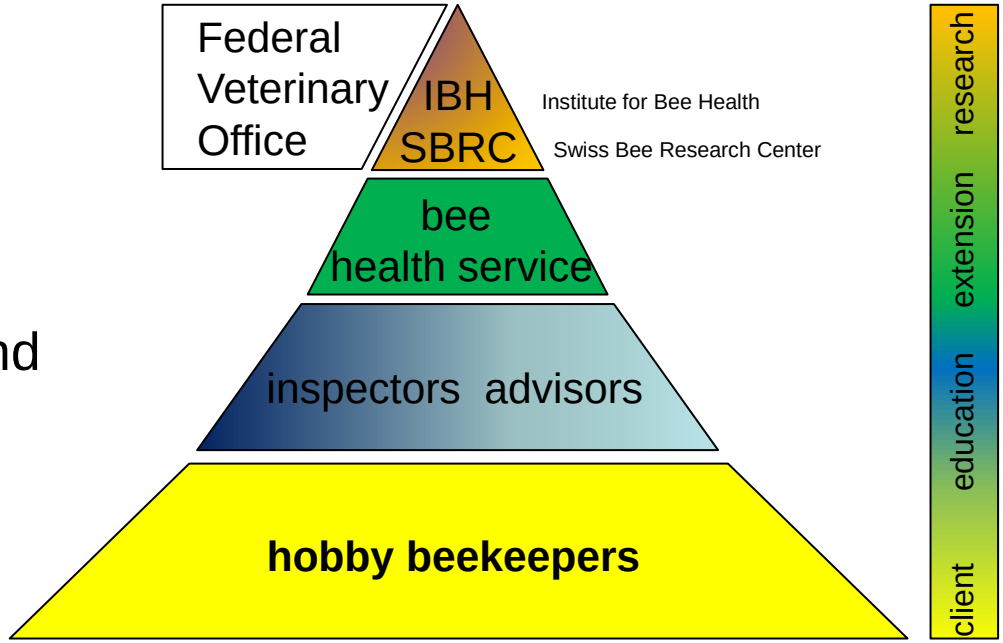
- number and diversity of beekeeper community

e.g. Switzerland



Progress made in the last years

education of beekeepers

some countries organise their branch
for better education:
e.g.:
- Germany: beekeeping is a recognised profession
- Switzerland founded Apissuise federation
- COLOSS European network founded ‘B-RAP’ working group

Much progress could be achieved with professional help!

Biggest challenge is to reach the ‘unreachables’

New or remaining challenges

research

honeybees and other bees

- how many do we loose? – how many do we have? –
- how many are needed for functional pollination service?
- what is the impact of diseases on bee populations?
- better understand and control diseases

funding tools

- more adapted to long term applied research

education

- increase beekeepers' skills
- reach the 'unreachables'

Thank you for your attention

Agroscope good food, healthy environment