SURVEY OF ANTIBIOTICS RESIDUES IN HONEY ON THE SWISS MARKET

P. EDDER, D. ORTELLI, C. CORVI

Service de Protection de la Consommation, 22 Quai Ernest-Ansermet, CH-1211 Genève 4, Switzerland

1. INTRODUCTION

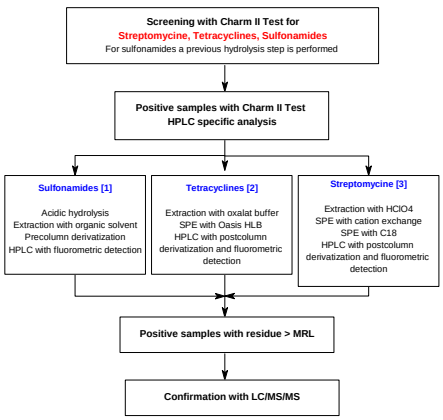
The European and American foulbrood are bacterial diseases extremely dangerous for bees, able to destroy completely and rapidly an apiary. Furthermore, these bacteria can propagate very easily to other bee-hives and presents a very high danger for honey producers.
Antibiotics such as streptomycin, tetracyclines and sulfonamides are often used in bee-keeping as preventive or therapeutic treatment to protect apiary.
Analytical methods have been developed to monitor the presence of antibiotic residues in honey. Rapid screening is performed with the Charm II test and the quantitative measurements of streptomycin, tetracycline and sulfonamide residues are done by HPLC. In case of residue levels higher than MRL a LC/MS/MS confirmation is performed.
The detailed results of a survey of around 500 honeys are presented and show a high number of positive cases, but also a lot of honeys with residue concentrations above the MRL's and sometimes with large overtakings.

2. SWISS AND EUROPEAN LEGISLATION

The legislation varies considerably from a country to another and antibiotic therapy is authorised in some countries, but absolutely prohibited in others like in Switzerland. However, some MRL's have been fixed in Switzerland for imported honeys. There are no MRL's in the UE.

Antibiotic	Swiss MRL's
Sulfonamides	50 µg/kg
Tetracyclines	20 µg/kg
Streptomycine	20 µg/kg

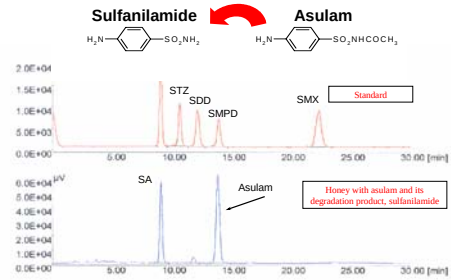
3. SCHEME OF THE ANALYTICAL PROCEDURE



4. REMARKS ABOUT ANALYTICAL METHODS

Sulfonamides

- 80 to 90% of sulfonamides are bound to sugars and an hydrolysis step before extraction is absolutely necessary in order to obtain good recoveries.
- Para-aminobenzoic acid (PABA), a natural substance, interfers with the Charm test screening method and creates a lot of false positives. PABA is also able to be derivatised by the fluram and become fluorescent. Furthermore, PABA interfers in the confirmation HPLC method. Generally, PABA elutes near sulfamethazine.
- Asulam, used as an herbicide, has a chemical structure like a sulfonamide. Residues can be found in fields and contaminate honey. Moreover, sulfanilamide is formed by asulam degradation.
- Sometimes LC with fluorescence detection is not enough selective and LC/MS/MS confirmation is necessary



SA=sulfanilamide; STZ=sulfathiazole, SDD=sulfadimidine; SMPD=sulfamonomethoxypyridazine, SMX=sulfamethoxazole

Tetracyclines,

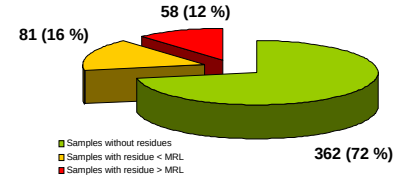
Charm II test gives good results with a few false positives results.
The selectivity of the HPLC-fluorescence methods are often very poor. The MRL (20 µg/kg) could be difficult to reach. Complementary LC/MS/MS analysis is needed.

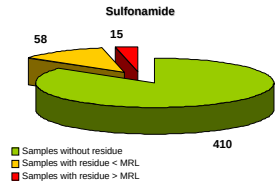
Streptomycine

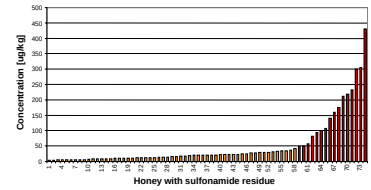
Charm II test gives good results with a few false positives results.
The HPLC fluorescence method is time consuming and need an extensive sample handling.

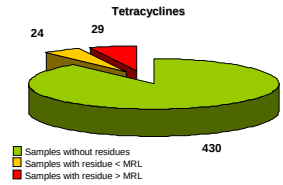
5. SURVEY OF ANTIBIOTICS RESIDUES IN COMMERCIAL HONEYS

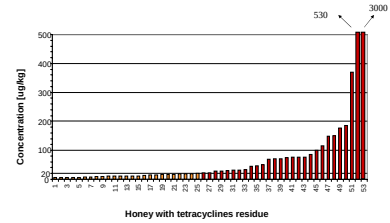
About 501 commercial honey sampled on the Swiss market since 1998

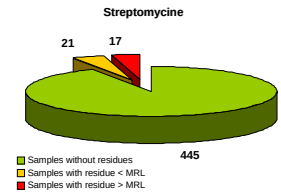


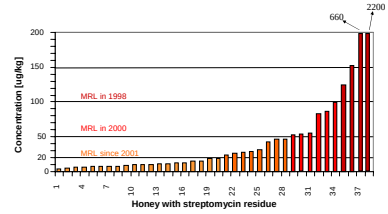




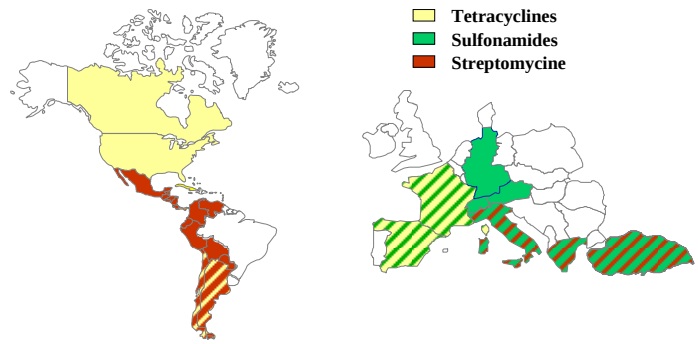








Typical residues according to the honey origin



- No results for honey from Asia or Oceania, because only mixtures with European or American honey are sold on the Swiss market.
- In some mixture, origin is very difficult to know and only continental informations are given.
- Sometimes, the residues found are not due to an antibiotic therapy, but are the result of an illegal mixture with cheaper foreign honey

6. CONCLUSIONS

- Analysis of antibiotic residues is difficult and classical methods with LC/fluorescence have some selectivity problems. However these methods can be used for routine purposes, but results with residues higher than MRL must be confirmed by LC/MS/MS.
- In most of countries, e.g. U.E., there is a lack in the legislation concerning antibiotic bee therapy and residues in honey. Therefore, antibiotics are often used and residues frequently found in honey. Sometimes, very high concentrations (above 1 mg/kg) are observed.

7. BIBLIOGRAPHY

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